NASA CR-145127

GENERAL PURPOSE COMPUTER PROGRAM FOR INTERACTING SUPERSONIC CONFIGURATIONS

PROGRAMMER'S MA

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BY

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FOR

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Summary

This manual contains details for the program ISCON, an abbreviation for "Inter acting Supersonic Configuration". The programmer will find an accompanying User's Manual necessary to execute test cases.

The work was accomplished by Bell Aerospace Textron under contract NAS1-13986 with the National Aeronautics and Space Administration, Langley Research Center, Hampton, Virginia.

The program was written in Fortran IV for the CDC 6400/6600 series computers at NASA, LRC.

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INTRODUCTION

This manual describes the computer program in support of the problem to generate a numerical procedure for the determination of unsteady aerodynamic forces on arbitrary interacting wings and tails in supersonic flow. See Reference 1.

The information presented here is geared to the programmer. It is sufficient to fully describe the program logic and the required peripheral storage. Figure 1 gives an overview of the entire program, and is the basis for the control program. A separate section is devoted to the definition of external files. Program limitations and convergence criteria are discussed. Individual subroutine write-ups are presented along with the complete Fortran source listing.

All User oriented information is contained in the ISCON User's Manual. For a presentation of input format and test case results this manual should be consulted.

Section 1

Computer Program Flow

Figure 1 illustrates the computer program flow of the ISCON program. The program is divided into two phases - mesh generation phase and solution.

Mesh Generation Phase

This phase reads and processes all input, generates the mesh, prints the grid and determines dynamic storage area constants. The downwash coefficients are computed by LOOPW for all frequencies and computes wake effects if desired.

Solution Phase

In the solution phase, each frequency is selected for solution.

The downwash is generated for each mode by using DIAG and ITRATE. Wake effects are iterated if present. The output is displayed and the program now cycles to the next case.

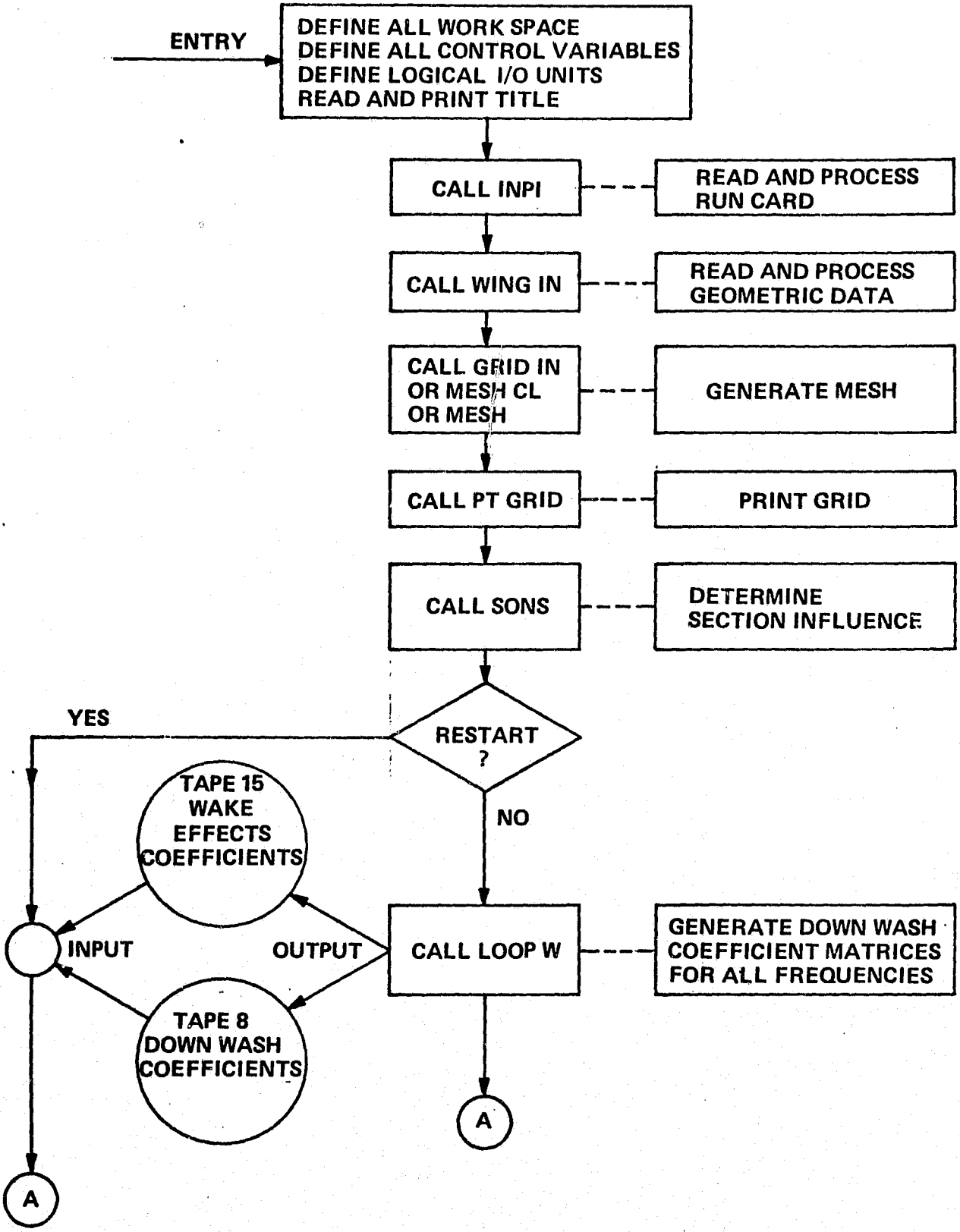


Figure 1. Computer Program Flow

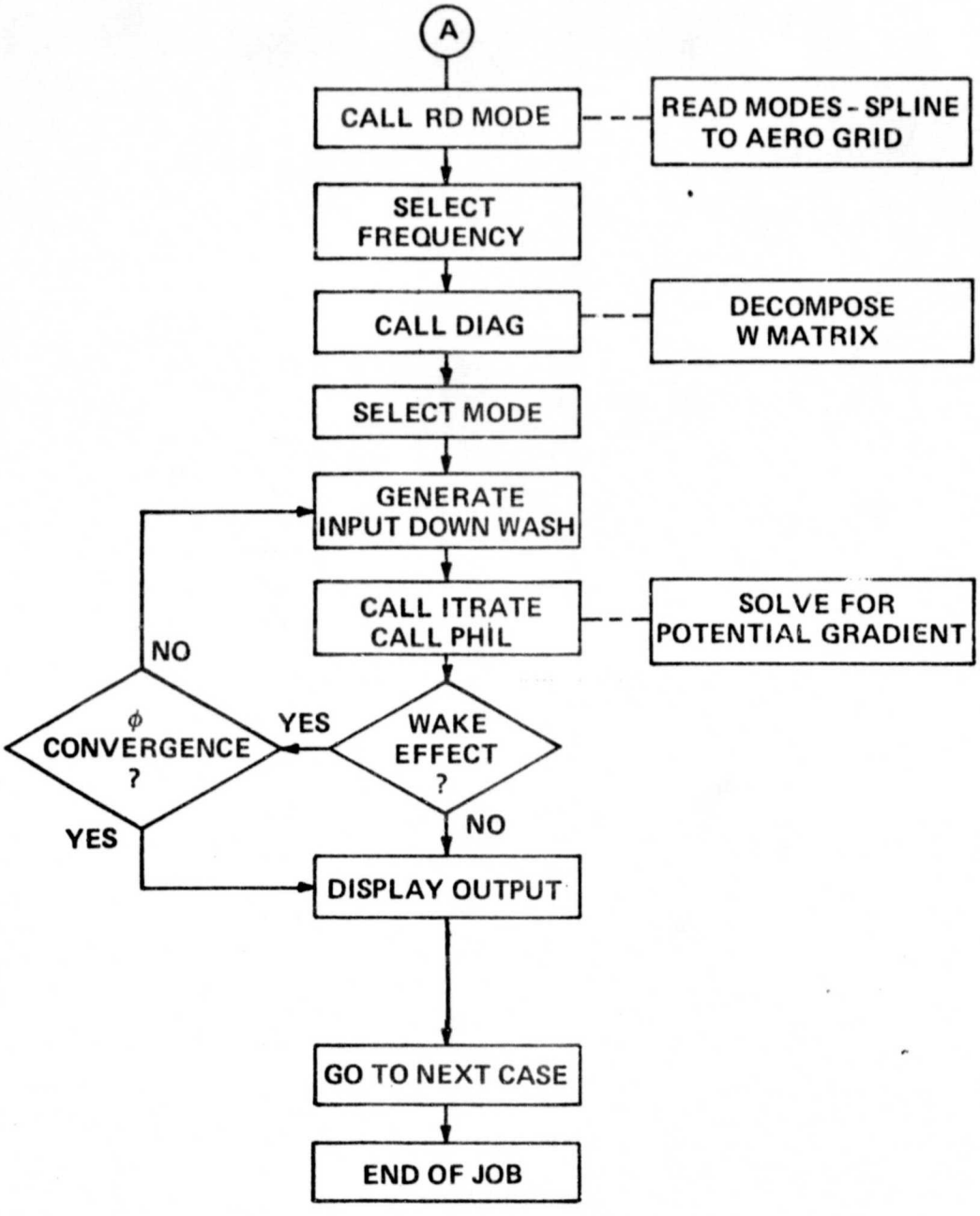


Figure 1. Computer Program Flow (contd)

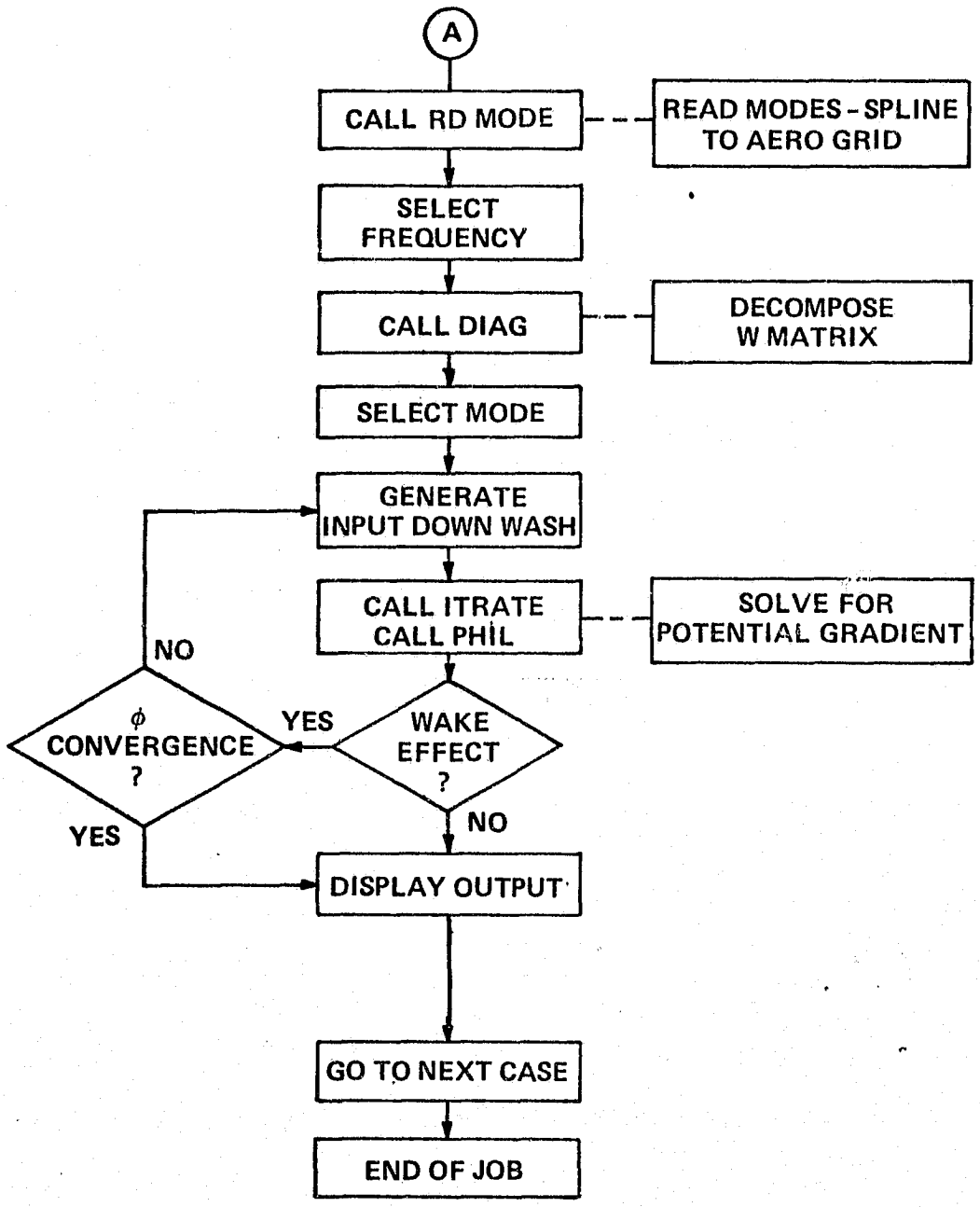


Figure 1. Computer Program Flow (contd)

Section 2

External File Structure

This program uses eleven (11) files during the course of operation. The delivery version of the ISCON program defines the unit designations with a block data statement which assigns values to COMMON TAPE. These may be altered if desired.

UNIT NAME	UNIT ID	TYPE	USAGE
I9	8	(S,P)	Store downwash coefficients for all frequencies
I10	10	S	Card images for 1 case, diagonal blocks of coefficients
I11	11	S	Off diagonal blocks of coefficients
I12	12	(S,W)	Wake coefficients for 1 frequency
I13	13	S	Store ETA and dETA/dx
I14	14	S	Store ETA and dETA/dx
J9	9	S	Time Print BCD tape
I15	15	(S,P,W)	Wake Element effects for 1 frequency
I5	5	P	Standard Card input
I6	6	P	Standard Line Printer
(not defined in Fortran)		P	Standard Plot Tape

Where S = Scratch, W = Wake, P = Permanent

If the restart feature is desired, then units designated as (P) must be permanent files. Units I12 and I15 are only required when WAKE effect is desired. When Plot is requested, the standard plot tape is needed.

Section 3

PROBLEM SIZE LIMITATIONS

At delivery date, this program contains the following limitations (these limitations may change):

1.	Number of wings	4
2.	Number of sections/wing	3
3.	Number of modes	10
4.	Number of spans	100
5.	Number of corner points/wing	8
6.	Number of frequencies	12
7.	Number elements/span	70
8.	Number of elements:	-

The maximum number of elements is based on the amount of dummy storage made available NDUM = the number of storage set when the program is compiled. At delivery, NDUM is set so that the program is capable of handling 300 elements. Since the number of elements is defined by the mesh generator, the mesh is generated by the program first. Then the amount of required storage is determined. If enough storages are not available in the program, the run is terminated, and the program cycles to the next case.

Section 4

CONVERGENCE CRITERIA

Convergence criteria are set up in the program using block data statements. These constants may be changed by altering their value in the block data subprogram.

1. Criteria of Convergence for both wake and potential gradient iteration is used by the subroutine IRELE. This uses a norm type of convergence based on EPS = .01. EPS is set up in common block CEPS.

2. The maximum number of iterations used for potential gradient iterations in subprogram ITRATE is assigned the variable name ITMAX. This variable is set at 10 in the program delivery version. It is included in the common block ITERAT.

3. The parameter PERC is required by LOOPW. It is used to improve computational economy in computing the velocity influence matrix. PERC represents the ratio of W_{ij}/W_{ii}, that is, the ratio of far field influencing coefficient to the receiving element self coefficient. This variable is set equal to .005 and is contained in common block PEREPS.

Section 5

Subroutine Write-Ups

The main computer program COMMON blocks are defined in this section. These blocks are referenced by the subroutine write-ups which are presented alphabetically for each subprogram.

COMMON BLOCKS

NAME	VARIABLES	DEFINITIONS	SUBROUTINE REFERENCE
BASIC	MACH	Mach Number	FGEN, MECH, MESHCL, WINTGR
	BEETA	SQRT ($MACH^2-1$)	
CEPS	EPS	Convergence criteria for ITRATE, IRELE	IRELE, ITRATE
EEW	XUP,YUP	X and Y coordinates of the upper end of the influencing line	WINTGRR, WVINT
	XLW,YLW	X and Y coordinates of the lower end of the influencing line	
	EREØNE	Logical variable set to .TRUE. if a line (in the right hand sense) has influence on a given receiving point	
	EMIRRO	Logical variable set equal to .TRUE. if the mirror image of the line has influence on a given receiving point	
	RR	Average hyperbolic radius of the endpoints of an influencing line with respect to given receiving point	
	RL	Average hyperbolic radius of the mirrorimage of the endpoints of an influencing line with respect to a given receiving point	
	RTR	The product of the hyperbolic radii at the endpoints of an influencing line with respect to a given receiving point	
	RTL	The product of the hyperbolic radii at the endpoints of the mirror image of an influencing line with respect to a given receiving point	

NAME	VARIABLES	DEFINITIONS	SUBROUTINE REFERENCE
FQ1	NFREQ	Number of frequencies that are input for the current run	MAIN,FGEN, FREQW,LOOPW, WAKET,WINTGR
	CF	An array, a list of 30 frequency coefficients for each frequency	
	FREQ	A list of the frequencies input	
	FREQP	A list of modified frequencies FREQP(I)=FREQ(I)*MACH/BEETA	
	FRTEST	The largest modified frequency	
	NTMXX	The maximum number of non-zero frequency coefficients	
ITERAT	ITMAX	Maximum number iteratives	ITRATE
ITG	IGUESS	Guess vector indicator	ITRATE
K1112	KST11 KST12	Maximum element numbers for non-zero coefficients	ITRATE,DIAG, WAKET,WRITEO, WTEPHT
MCOM	CFTABLE	Table of equations coefficients for mode polynomial	RDMODE
MODEF	EM	Storage for modal values for a single point	MFUN, RDMODE
	DM	Storage for values of the derivative of the modes for a single point	
	X	X coordinate of the point	
	Y	Y coordinate of the point	
	J1	Wing number that the point is on	
	J2	Section of WING J1 that the point is on	
NEXTCS	IFLUSH	Set equal to if an error is found that is serious enough to cause termination of run	MAIN,INPI, WINTGR

NAME	VARIABLES	DEFINITIONS	SUBROUTINE REFERENCE
PARAM	NWING	Total number elements in structure	FREQW
RRLL	TVW	Transformation matrix to change the velocity influence coefficients from the receiving point to the influencing point	LØØPW, RTØI, WINTGR
	YRO, YLO	Y coordinate of the receiving element in the system of the influencing element, YLO is in the system of the mirror image of the influencing element	
	ZR	Z coordinate of the receiving element in the system of the influencing element	
	ZRZR	ZR*ZR	
	ZL	Z coordinate of the receiving element in the system of the mirror image of the influencing element	
	ZLZL	ZL*ZL	
TAPE	I9,I10, I11,I12, I13,I14, J9,I15	File numbers set up by block data subprogram	MAIN,DIAG, ITRATE, LØØPW, TIMØUT, WRITEØ
TIMER	ITIME	Time point array	MAIN
VELCOM	NMAX	Maximum dimension of D	MAIN,DIAG, ITRATE
	PRINT	Print control	
	NWBLOCK	Number blocks for ITRATE	
	NWROW	Number rows in block	
WAKEUP	WTES	Array of wake effects for elements	MAIN,DIAG, LOOPW,WAKET, WINTGR
	TREDGE	Trailing edge indicator	
	WAKE1	Wake indicator	
	WAKE	Wake indicator	
	WAKENZ	Wake indicator for non-zero term	

NAME	VARIABLES	DEFINITIONS	SUBROUTINE REFERENCE
WV1	NTERM	Number of terms taken in the finite series approximation of the velocity influence expression	WINTGR, WVINT
	V(30)	Array of sidewash contributions for up to thirty terms	
	W(30)	Array of upwash contributions for up to thirty terms	
WW1	XO,YO,ZD	The X, Y and Z coordinates of a receiving point	LØØPW, WVINT, WINTGR
	ZDZD	ZD*ZD	
	SYMK	Symmetry code of the wing that the influencing element is in	
	NINSID	A counter to tell how many elements in the current span, from the bottom up, that have been found to have influence on the current receiving point, so far	
XYSCAL	XX	X coordinate of a point	ZFDZ
	YY	Y coordinate of a point	
	XO	Offset value in X direction currently taken to be 0.0.	
	YO	Offset value in Y direction, currently taken to be 0.0.	
	BREF	Scalar transformation value, currently set to 1.0	
	ZZZ	Value of first mode input	
	ITEST	Set equal to 1 if mode is a constant for the entire grid	
ZFDZIO	I5 I6	Input unit numbers Output unit numbers	MAIN,READAB, READXY

NAME	VARIABLES	DEFINITIONS	SUBROUTINE REFERENCE
ZFUNNY	N	Number points on structural grid for spline	ROMODE, READAB, ZFDZ
	IERF	Error indicator number	
	B1,B2,B3	Spline constants	
	NFUNMX	Maximum N value	

Subroutine Write-Ups

Name	Function	Page
MAIN	Main calling program	5.10
BLOCK	Define COMMON constants	5.12
CABSO	Compute absolute value of a complex number	5.14
DECOM	Decompose matrix for solution	5.15
DIAG	Determine matrix blocks	5.17
ECHO	Provide input deck echo print	5.19
EFPLOT	Calls LRC CALPLT plot routine to end plot tape	5.21
EONE	Generate element influence	5.22
FGEN	Generate frequency coefficients	5.23
FREQW	Determines coefficients for 1 freq.	5.25
GETTIM	Transforms CPU time to integer	5.26
GRIDIN	Reads grid input data	5.28
INP1	Reads and analyzes RUN card	5.30
IRELE	Test for convergence	5.34
ITRATE	Iteration equation solver	5.35
LOOPW	Evaluate W, Wake coefficients	5.36
MESH	Grid for section without control lines	5.40
MESHCL	Grid for section with control lines	5.42
MFUN	Generate modes by polynomial	5.44
MXERR	Prints error messages	5.45
OUTP1	Prints velocity potentials, pressures	5.46
OUTP2	Prints total lift and total pressures	5.47
OUTP3	Prints aerodynamic coefficients	5.48
PHIL	Generate velocity potential	5.49
PLOT	Calls LRC CALPLT and NFRAME plot routines	5.51

Subroutine Write-Ups (contd)

Name	Function	Page
PLOTGD	Plots aerodynamic grid	5.52
PTGRID	Prints aerodynamic grid	5.54
RDETA	Read ETA from files 14, 15	5.56
RDMODE	Read and generate mode data	5.57
READAB	Read spline coefficients	5.60
READXY	Read Structural Grid	5.62
RSTART	Reads and checks restart files	5.64
RTOI	Generates transformation matrices	5.66
SOLVE	Backsubstitution for solution	5.58
SONS	Finds influence of sections	5.70
SONSPT	Prints influence of sections	5.72
SYMBOL	Calls LRC plot routine NOTATE	5.73
TIMOUT	Time print on file J9	5.74
TMAX	Computes the maximum elements in a real array	5.76
TRANS	Transformation of coordinates	5.77
WAKET	Write wake effects on file T12	5.78
WINGCK	Check course points for compatibility	5.80
WINGIN	Read wing input data	5.82
WINTGR	Computes W coefficients for 2 elements	5.87
WRETA	Write ETA in file I13 and I14	5.89
WRITEO	Write W coefficients on file I11	5.90
WRITZ	Write W coefficients in file I10	5.91
WRITZW	Write Wake effects on file I12	5.92
WTEPNT	Generate wake effects	5.93

Subroutine Write-Ups (contd)

Name	Function	Page
WVINT	Evaluates equations for influence coefficients	5.95
ZFDZ	Evaluate model functions and derivatives	5.96

1. Subroutine Name: MAIN

2. Purpose:

The main organization of the ISCON program is defined here. See Section 1 for a description of this subprogram and program flow.

3. Subroutine Required:

DIAG	SONS	RDETA	MESHCL
ECHO	LOOPW	WRETA	PLOTGD
FGEN	MXERR	EFPLOT	PTGRID
INP1	OUTP1	GETTIM	RDMUDE
MESH	OUTP2	GRIDIN	RSTART
PHIL	OUTP3	ITRATE	SONSPT
TIMOUT	WINGIN	WTEPHT	

See Section 6 for the function of each one of these subroutines.

4. Files Used:

I5, I6, I9, I10, I11, I12, I13, I14, J9, I15

These files are defined in Section 2.

5. Common Blocks Used:

BASIC	Contains	Mach number variables
FQ1	Contains	frequency variables
MXSTOR	Contains	maximum parameters
NEXTCU	Contains	error control
TIMEP	Contains	time variable
Param	Contains	no. elements
TAPE	Contains	tape definitions
WAKEUP	Contains	WAKE parameters
VELCOM	Contains	iteration parameters

WAKE	Contains	wake controls
ZFDZIO	Contains	ECHO tape def.
ZFUNNY	Contains	mode function parameters

6. Calling Sequence: None

1. Subroutine Name: BLOCK DATA

2. Purpose:

Set up constants. Common blocks used in tape definitions, convergence criteria, print controls, iteration maximums, and storage limits.

3. Common Blocks:

ITERAT	Maximum no. iterations
MXSTOR	Maximum storage limits
TAPE	File definitions
VELCOM	Maximum block size, print control

4. Definitions:

1. ITERAT — ITMAX=10=maximum no. iterations for solution

2. MXSTOR
   - NWINGS = no. wings = 4
   - NSECTN = no. sections = 3
   - NMODES = no. nodes = 10
   - NSPANS = no. spans = 100
   - NCORNR = no. corner pts. = 8
   - NFRQUN = no. frequencies = 12
   - NEPSPN = no. elements/span = 70
   - NMXFDZ = no. mode storage = 300

3. TAPE
   - I9 = 8
   - I10 = 10
   - I11 = 11
   - I12 = 12
   - I13 = 13

I14 = 14

J9 = 9

I15 = 15

See Section 2 for file descriptions.

4. VELCOM NMAX = maximum solution block size = 10

PRINT = print control = 2

5. Calling Sequence: None

1. Function Name: CABSO

2. Purpose:

   Compute absolute value of complex number.

3. Input Arguments:

   A = complex number

4. Output Argument:

   CABSO = value of function

5. Subroutine User: IRELE

6. Subroutine Used: SQRT

7. Calling Sequence:

   CABSO = CABSO(A)

1. Subroutine Name: DECOM

2. Purpose:

Factorization of the matrix A into a product of a lower triangular matrix L and an upper triangular matrix U. L has a unit diagonal which is not stored.

3. Equations and Procedure:

Matrix triangularization by Gaussian elimination. See Algorithm 423, "Collected Algorithms from CACM", by Cleve Moler.

4. Input Arguments:

N	Order of the Matrix A
NDIM	First dimension of A declared in calling program. If A is singly subscripted in calling program, set NDIM=N.
A	On input the matrix to be factored.

5. Output Arguments:

A	On output A(I,J) I.LE.J contains the upper triangle U, A(I,J) I.GT.J contains (I-L), where I is the identity matrix and L is the lower triangle.
IP	IP(K) K.LT.N contains the row interchange information. IP(N) contains (-1)**(number of interchanges) or 0.

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   Call DECOM(N,NDIM,A,IP)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 347 words

13. Subroutines Used: None

14. Subroutine User: MAIN

15. Remarks:

   (1) If IP(N)=0 then matrix A is singular.

   (2) Use DECOM in conjunction with subroutine "solve" to obtain the solution of the linear system A*X = B.

   (3) Determinant(A) = IP(N)*A(1,1)*A(2,2),*....*A(N,N).

   (4) The row interchange information stored in IP is not easy to interpret. However, it is used properly by "solve".

1. Subroutine Name: DIAG

2. Purpose:

Process coefficient matrix for 1 frequency.

The incore blocks are determined based on the W coefficient matrices stored on file I9. After decomposing, the diagonal blocks are stored on file I10. The off-diagonal terms are stored in compressed form on file I11. If wake effects have been computed, the wake coefficients are stored in compressed form on file I12. WAKENZ is set .FALSE. if no wake effects or else.TRUE. on return.

3. Input Arguments

IF	frequency number
LRE	logical record length on tape I9
NNCH	row number of trailing edge elements
MC	maximum dimension of incore matrix
NET	number of elements in total system
FRQ	frequency value
NSPT	No. trailing edges

4. Output Arguments

WROW	W coefficients work storage from file I9
D	decomposed block (incore) stored on file I10
AROW	off diagonal block stored on file I11
IZ	non zero element numbers array
IP	decomposing information array
CWROW	wake coefficients work storage from file I15
CAROW	wake effects for 1 frequency stored on file 12

5. Subroutines Used:

WRITEO

WAKET

DECOM

FREQW

6. Subroutine User:

Main program

7. Calling Sequence:

CALL DIAG (WROW, IF, LRECL, NNCH, MC, D, NET, AROW, IZ, IP, NSPT, FRQ, CAROW, CWROW)

8. Files Used:

I9 = (input) file containing W coefficients, for all frequencies

I10 = diagonal block, decomposed for 1 frequency (output)

I11 = off diagonal terms (output)

I15 = (input) wake coefficients

I13 = wake effects for 1 frequency in compressed form

1. Subroutine Name: ECHØ

2. Purpose:

   To read the input for a given case, and print out an echo check of the input data.

3. Equations and Procedures:

   The input deck is read from unit I5, and placed on unit I11 and printed with format control on unit I6. If an end of file is encountered, the subroutine sets the variable KØNTRL equal to 1.

4. Input Arguments: None

5. Output Arguments:

KØNTRL	Integer variable set equal to 1 if an end of file is encountered on reading the input stream.

6. Common Blocks:

   /TAPE/

I11	Unit number of file to have card images of input stream.

   /ZFDZIØ/

J5	Unit number of input stream - card reader
J6	Unit number for printed output

7. Error Returns: None

8. Calling Sequence:

   Call ECHO(KØNTRL)

9. Input Tapes: None

10. Output Tapes:

    Ill Contains card images of input deck.

11. Scratch Tapes: None

12. Storage Required: 225 words

13. Subroutine Required: None

14. Subroutine User: MAIN

15. Remarks:

    The test for the end of file differs from IBM to CDC. Make sure that the correct coding is present for the correct installation.

1. Subroutine Name: EFPLOT

2. Purpose:

To end the plot tape on the CDC version.

3. Equations and Procedure:

CDC plot routine is called to end the tape, CALL CALPLT (0.0, 0.0,999). This routine replaces the IBM version of the CALCOMP routine EFPLOT.

4. Input Arguments:

A Dummy argument, not used, but present to keep the call to the routine identical to the IBM-CALCOMP version of EFPLOT. (In that version this argument represents four characters to be printed out on the plot just before ending the plot tape.)

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence: Call EFPLOT(A)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: relatively very small

13. Subroutine Required: CALPLT

14. Subroutine User: MAIN

15. Remarks:

This subroutine is not used in the IBM version. It is replaced by the standard CALCOMP routine of the same name.

1. Subroutine Name: EONE

2. Purpose:

This routine determines if an element and its mirror image are in the Mach cone.

3. Equations and Procedure:

This routine examines the end points of a line. If either one end point or the other is in the Mach cone, the line is in the mach cone and EREONE is set equal to .TRUE. The mirror image of the line is found and the same test is made. If the mirror image of the line is inside the MACH cone then EMIRRO is set equal to .TRUE. This routine is used to test only one line per call.

4. Input Arguments: None

5. Output Arguments: None

6. Common Blocks Used:

/EEW/

/RRLL/

/WW1/

7. Error Returns: None

8. Calling Sequence: CALL EONE

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 275 words

13. Subroutines Required: None

14. Subroutine User: WINTGR

15. Remarks: None

1. Subroutine Name: FGEN

2. Purpose:

To calculate KAPPA and the frequency coefficients for each frequency.

3. Equations and Procedure:

For each frequency, K, the modified frequency KAPPA is defined by:

$$KAPPA = \frac{K*M}{\sqrt{M*M-1}}$$

where M is the MACH NUMBER.

(The list of frequencies is stored in FREQ, and the modified frequencies are stored in FREQP).

The frequency coefficients are calculated from:

$C_1 = 1.0$

$$C_J = -C_N * \left(\frac{KAPPA**2}{(2*N)(2*N-1)}\right)$$

for $J > 1$, where $N=J-1$.

Currently a maximum of 30 terms are taken (J=30) for each frequency. A check on the exponent is made to avoid an exponent underflow. A scalar, XUNDER, is defined to be -77.5 on the IBM machine and -292.0 on the CDC machine. This is close to the largest negative exponent allowed each machine.

4. Input Arguments: None

5. Output Arguments: None

6. Common Blocks Used:

/BASIC/ and /FQ1/

7. Error Returns: None

8. Calling Sequence: Call FGEN

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 263 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: FREQW

2. Purpose:

Read one record W coefficient for all frequencies from file I8. The coefficients for the input frequency are then determined and stored in AROW.

3. Input Arguments:

I8 = file number containing coefficients

NF = frequency number

LRECL= length of file recond on file I8

4. Output Arguments:

WROW = work storage for coefficients all frequencies

AROW = output coefficients record - one frequency

5. Files Used:

I8 = input file containing W coefficient

6. Subroutine User: DIAG

7. Calling Sequence:

Call FREQW (I8,AROW,WROW,NF,LRECL)

1. Subroutine Name: GETTIM

2. Purpose:

   This is a FØRTRAN routine to be used on the CDC machine only. It replaces an identically named system routine on the IBM 360-65 at Bell Aerospace. This routine calculates the elapsed CPU time in milliseconds and stores it as an integer.

3. Equations and Procedure:

   This routine depends on the CDC routine ØECØND, which returns the elapsed CPU time in seconds as a floating point number. Subroutine GETTIM multiplies this number by 1000 and stores it in second location of an integer array, eight words in length. This will mimic the IBM system routine GETTIM.

4. Input Arguments:

   ITIME — Integer array of length 8.

5. Output Argument:

   ITIME — Integer array of length 8, time is put in second location.

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   CALL GETTIM (ITIME)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: Small

13. Subroutines Required:

    SECOND, a CDC routine that gives elapsed CPU seconds.

14. Subroutine User: MAIN

15. Remarks: None

1. Subroutine Name: GRIDIN

2. Purpose:

To read in specific grid information for one section and generate mesh for that section.

3. Procedure:

a) GRID card is read and checked.

b) SPAN card is read and checked.

c) CHORD cards are read for every span.

Cards are checked to make sure elements are not crossed.

d) The next SPAN card is read, along with its CHORD cards for every span.

e) Next input card is read.

4. Input Arguments:

I5	Input unit (usually card reader 5)
I6	Output unit (printer 6)
ERROR	Logical that comes in false, may be set true
BEETA	Sort (Mach*Mach-1) used to transform CORNX and CL
NWING	No. wings in structure
NSECT	Array no. sections in each wing

LAB, ID, FD information on last card read

(Both input and output)

5. Output Arguments:

CORNX,CORNY,CORNZ	X,Y, and Z coordinates of corner points 1, 2, 3, 4, in global system
NSP	Desired number of spans for section (Input by user)
XYZ	4 X and 2 Y local coord. for each element of section

Z	Z coordinate for all elements in section (from trans)
TRS	2 by 2 trans matrix to go from local to global
NNCH	Element number (W.R.T. total structure of last element in span. (Used for labeling plot)
SW	Span width
XLE	Average X coordinate of leading edge per span
NE	Number of elements in section
ICL	ICL(I,J) Code for section I of wing J ICL(I,J) = -1 specified grid information is input here ICL is updated if another 'GRID' section is encountered after read present 'GRID' section
NETSV	Counter of total number of elements in structure

6. Common Blocks Used: None

7. Error Returns:

Input cards are checked. If an error is found, ERROR is set equal to .TRUE. and an error message is written.

8. Calling Sequence:

```
SUBROUTINE GRIDIN(CORNX,CORNY,CORNZ,XYZ,Z,TRS,NNCH,SW,XLE,
1 NSP, NE, NETSV, REFLEM, MFREQ, FREQ,
1 NWING, NSECT, ICL, ERROR,  BEETA, LBA, ID, FD, I5, I6)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 1244

13. Subroutine User: MAIN

14. Subroutine Required: TRANS

15. Remarks: None

1. Subroutine Name: INPJ

2. Purpose:

   To read and check the RUN data card.

3. Equations and Procedure:

   The RUN data card is read with a format of (A4,2X,9I2,4E12.0).

   a) A check is made to be sure that it is a RUN card.

   b) The first integer field contains the run type code and is stored in scalar ITRUN.

   c) The second integer field contains the plot request code. If there is a '1' in this field (column 10), a plot of the structure is to be generated, and the logical variable PLOTR is set equal to .TRUE..

   d) The first floating point field contains the mach number and is stored in the real variable MACH. A check is made to see that it is greater than 1.0.

   e) The third integer field contains the code to consider wake effects and is stored in the variable IWTE.

   f) The first floating point field contains the mach number and is stored in the real variable MACH. A check is made to see that it is greater than 1.0.

   g) The second floating point field contains the Reference length and is stored in REFLEN. A check is made to be sure that it was not input as 0.0.

   h) The third floating point field contains the pitching axis, and is stored in the variable XPIN.

i) The fourth floating point field contains the element aspect ratio. This is stored in the variable EARO.

4. Input Arguments:

I5	Logical unit number containing the input deck - usually the card reader.
I6	Logical unit number for output unit - usually the system printer.
TITLE	Array containing title as character information.
LAB	Input and output of character information in first 4 columns of current input card.
FD	Floating point array 4 words long to store floating point fields of current input card.
ID	Integer array 9 words long to store the integer fields of the current input card.

5. Output Arguments:

ITRUN	Run type requested. ITRUN=1, the run is a complete execution attempt. ITRUN≠1, the run is a "check run".
MACH	Mach number (a floating point number).
REFLEN	Reference length.
XP	Pitching moment axis after being normalized by BEETA and REFLEN.
XPIN	Pitching moment axis as input.
PLØTR	Logical variable set to .TRUE. if plotting is requested. Otherwise it is .FALØE.

BEETA BEETA=SQRT(MACH*MACH-1.0).

ERROR SET TO .TRUE if error condition is encountered.

EARO Element aspect ratio

IWTE Code set to 0 if wake effect is not considered
greater than 0 if wake effects are considered.

6. Common Blocks Used:

/NEXTCS/

IFLUSH Set equal to 1 if run card is not found. This will cause the main routine to terminate the current case.

7. ERROR RETURNS

See discription of IFLUSH above.

Logical ERROR is set equal to .TRUE. if any of several errors exist in reading the input. The error condition generates an appropriate error message. All error message format statements are numbered between 2000 and 2026. The following is a list of error messages in this routine. (All messages are preceeded by the statement ERROR IN READING INPUT).

a) RUN CARD IS MISSING OR OUT OF ORDER. RUN CARD MUST IMMEDIATELY FOLLOW THE TITLE CARD AND BE THE SECOND CARD IN THE INPUT DECK. JOB IS TERMINATED.

b) MACH NUMBER MUST BE GREATER THAN 1.0.
MACH NUMBER WAS READ AS _____.
MACH NUMBER WILL BE SET EQUAL TO 2.0 IN AN ATTEMPT TO CHECK THE REST OF THE DATA.

c) REFERENCE LENGTH WAS READ AS 0.0. THIS IS NOT ALLOWED. REFERENCE LENGTH WILL BE SET EQUAL TO 1.0 IN AN ATTEMPT TO CHECK THE REST OF THE DATA.
REFERENCE LENGTH MUST BE INPUT AS A NON-ZERO FLOATING POINT NUMBER IN COLUMNS 37 THROUGH 48 OF THE RUN DATA CARD.

d) OFF-DIAGONAL PERCENTAGE, IF ENTERED, MUST BE GREATER THAN OR EQUAL TO 0.0 AND LESS THAN 1.0.
OFF DIAGONAL WAS INPUT AS _____.

8. Calling Sequence:
CALL INP1(I5,I6,TITLE,ITRUN,MACH,REFLEN,XP,XPIN,PLOTR,IWTE, EARO,BEETA,LAB,ID,FD,ERROR).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 688

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: IRELE

2. Purpose:

Check relative error between A and B.

If Relative error is less than Eps, IRELE is set = 0 otherwise IRELE is set =1. If KRELE = 1, do not test for convergence.

3. Input Arguments:

A = argument #1

B = argument #2

KRELE = code to signify former convergence

4. Calling Sequence:

Function IRELE (A,B,KRELE)

5. Output Arguments:

IRELE = 1 means A, B has not converged.

IRELE = 0 means A, B has converged

6. Subroutine User: ITRATE,WAKET

1. Subroutine Name: ITRATE

2. Purpose:

Downwash equation solver using block iteration with successive over relaxation. See Reference 3.

3. Input Arguments:

I9 = file containing coefficients off diagonal

NWR = input downwash - real

NWI = input downwash - imaginary

MC = block dimension

4. Output Arguments:

GW = output solution vector

5. Work Storage:

D = diagonal block storage

6. Common Block:

CEPS	defines convergence
ITERATE	control variables for ITRATE
ITG	defines ELEMENT DATA on file
TAPE	file unit numbers
VELCOM	define block information

7. Calling Sequence:

```
CALL ITRATE (I9, NWR, NWI, GW, GT, MC, D, IP, DNWR, DNWI,
             RWR, RWI, NET, A, IZ, GWESS, WW)
```

8. Subroutines:

SOLVE

9. Used By:

MAIN program

1. Subroutine Name: LOOPW

2. Purpose:

To organize the calculation of the velocity influence matrix.

3. Equations and Procedure:

Procedure is outlined in the accompanying flow chart.

4. Input Arguments:

Input arguments are defined in the comment statements at the beginning of the routine.

5. Output Arguments:

Output arguments are also listed in comment cards in subroutine.

6. Common Blocks Used:

/FQ1/

/RRLL/

/TAPE/

/WAKEUP/

/WW1/

7. Error Returns: None

8. Calling Sequence:

Call LOOPW(NET,NWING,XYZ,NSP,SYM,TRS,NNCH,NE,NSECT,ZSECT, ISONS,I6,TAPE8,XCEN,AREA,WROW,LRECL,WTEROW,LRWTE,PERC, ERROR,IWTE,REFLEN)

9. Input Tapes: None

10. Output Tapes:

Two tapes are generated in the subroutine. The first is on logical unit TAPE8. The first record on this tape contains

the "restart record". This record contains the mach number, number of elements, reference length, wake element code, number of frequencies, and a list of the frequencies. Following is a record for every element on the tape. These records contain the element number and the array of influence coefficients for every frequency at every influencing element (all other elements).

If wake effect is requested, a second tape is written. This tape is defined on logical unit I15. It also begins with a restart record as defined above. It has a record only for those elements that have some nonzero wake coefficients. The record begins with the receiving element number and has a list of wake effects (complex numbers) for every frequency for every trailing edge number.

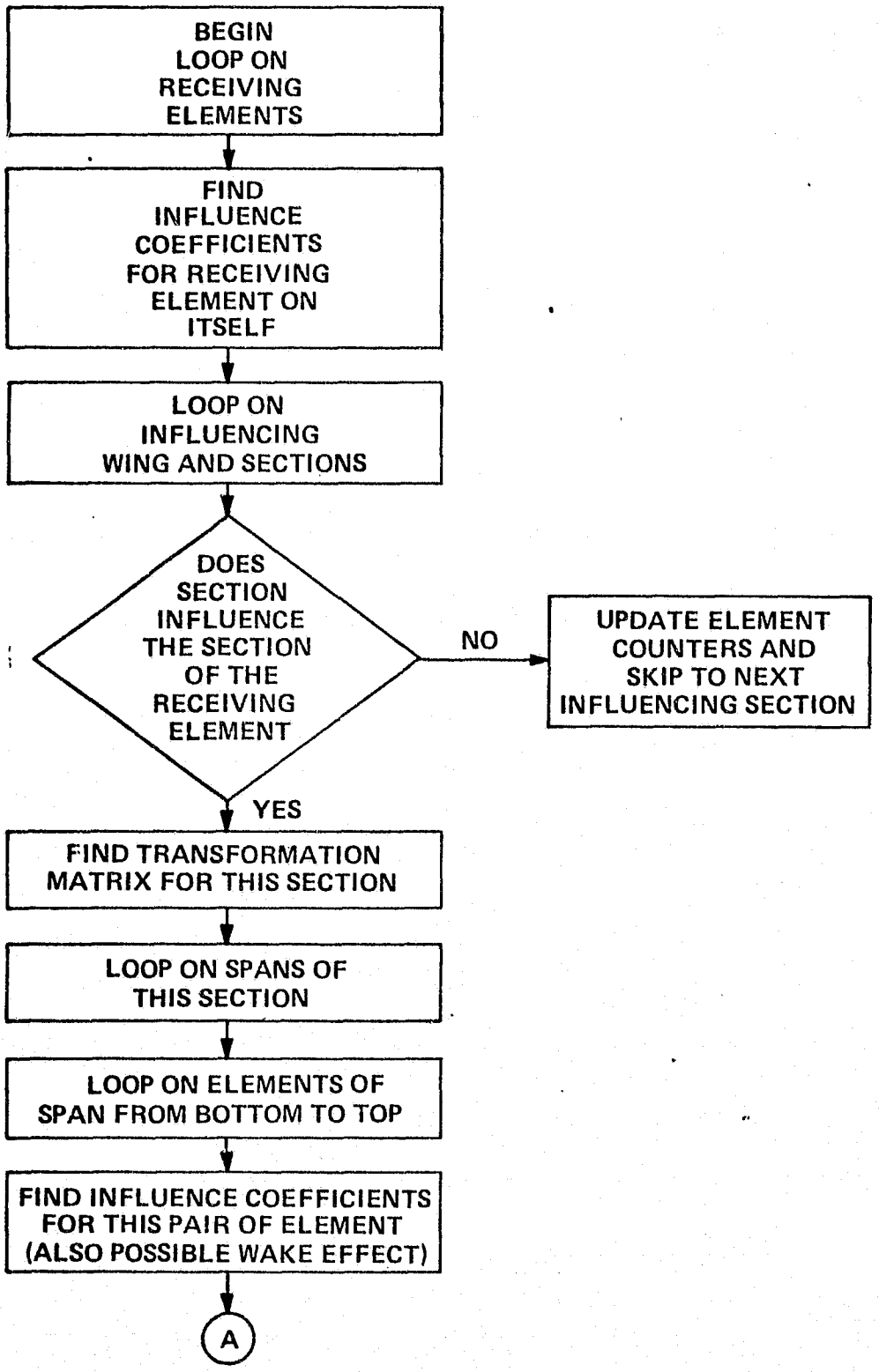
11. Scratch Tapes: None

12. Storage Required: 1110 words

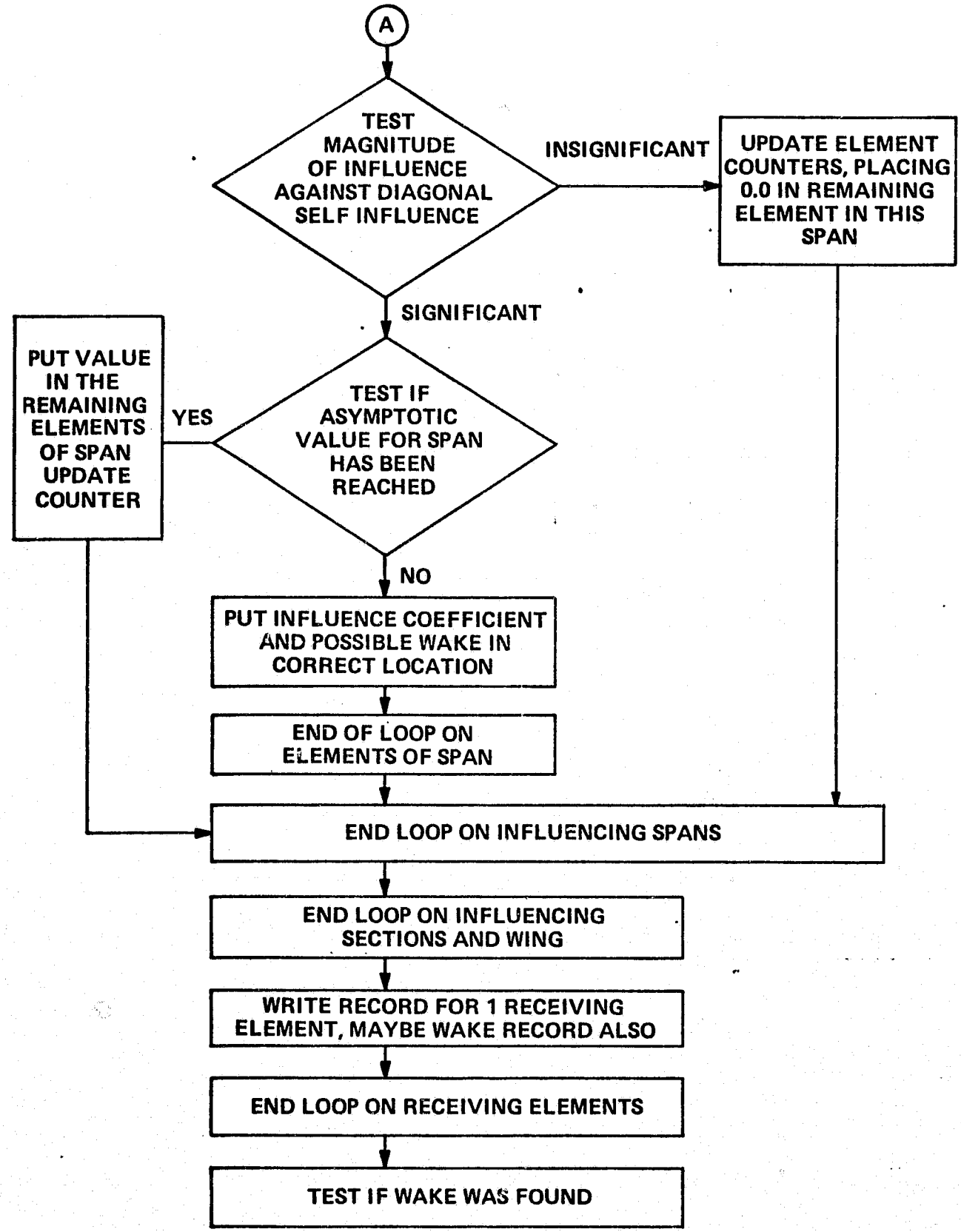
13. Subroutines Required: RTOI and WINTRGR

14. Subroutine User: MAIN

15. Remarks: Domain of Effective Far Field Elements - Contribution to the velocity component at a receiving point, from far field elements (i.e. when is large) is small. Computational economy can be agained by truncating the domain of influence, when the order of the magnitude of the influence coefficient W_{ij} is less than say (E) of W_{ii}. The parameter E is fixed in the program at .005 and called PERC. The programmer can update this quality by changing the variable PERC in the BLOCK DATA routine.



Flow Chart of Subroutine LOOPW



Flow Chart of Subroutine LOOPQ (Cont.)

1. Subroutine Name: MESH

2. Purpose:

To generate a mesh (grid) for a section without control lines.

3. Procedure:

Corner points of are input. These corner points are transformed to the aerodynamic reference system in subroutine TRANS. The number of spans (strip of the wing running parallel to the X axis) is input. This determines the span width. The height to width ratio of the elements is given by CRATIO.

4. Input Arguments:

CORNX,CORNY,CORNZ	X,Y, and Z coord. of corner pts. 1,2,3,4 in global system.
NSP	Desired number of spans for section (input by user).

5. Output Arguments:

XYZ	4 X and 2 Y local coord. for each element of section.
Z	Z coordinate for all elements in section (from trans).
TRS	2 by 2 trans matrix to go from local to global.
NNCH	Element number (W.R.T. total structure) of last element in span. (Used for labeling plot).
SW	Span Width.

XLE	Average X coordinate of leading edge per span.
NE	Number of elements in section.
NETSV	Counter of total number of elements in structure.

6. Common Blocks Used:

   /BASIC/

7. Error Returns: None

8. Calling Sequence:

   SUBROUTINE MESH(CORNX,CORNY,CORNZ,XYZ,Z,TRS,NNCH,SW,XLE,NSP, NE,NETSV).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 459 words

13. Subroutine User: MAIN

14. Subroutine Required: TRANS

15. Remarks: None

1. Subroutine Name: MESHCL

2. Purpose:

To generate a mesh (grid) for a section with 1 or 2 control lines.

3. Procedure:

The procedure is similar to subroutine MESH except that element size is determined by control lines.

4. Input Arguments:

CORNX,CORNY,CORNZ	X,Y and Z coord. of corner pts. 1,2,3,4 in global system.
NSP	Desired number of spans for section (input by user).
ICL	Number of control lines in section.
CL(1),CL(2)	x coord. of first control line.
CL(3),CL(4)	x coord. of second control line.

5. Output Arguments:

XYZ	4 X and 2 Y local coord. for each element of section.
Z	Z coordinate for all elements in section (from trans).
TRS	2 by 2 trans matrix to go from local to global.
NNCH	Element number (W.R.T. total structure) of last element in span. (Used for labeling plot).
SW	Span width.

XLE	Average X coordinate of leading edge per span.
NE	Number of elements in section.
NETSV	Counter of total number of elements in structure.

6. Common Blocks Used:

   /BAØIC/

7. Error Returns: None

8. Calling Sequence:

   Subroutine MESHCL(CORNX,CORNY,CORNZ,XYZ,Z,TRS,NNCH,SW,XLE, NSP,NE,NETSV,ICL,CL).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 829 words.

13. Subroutine User: MAIN

14. Subroutine Required: TRANØ

15. Remarks: None

1. Subroutine Name: MFUN

2. Purpose and Equations:

   a. Generate modes by using a quadratic polynomial

   b. The coefficients are supplied by a table - CTABLE

   c. The wing number and mode number are stored in IFTABL

   d. The derivative is formed and stored in DM

   e. $EM = C_o + C_x X + C_y Y + C_{xy} XY + C_{xx} X^2 + C_{yy} Y^2$

      $DM = C_x + C_{xy} Y + 2C_{xx} X^2$

3. Input Arguments:

   JMODE = number modes

4. Common Blocks:

   a. Common/MFUN/CTABLE,IFTABLE,NTABL,NFQF

      This common block contains input:

      1) CTABL =coefficient tables

      2) IFTABL =table containing wing number and mode number

      3) NEQF =number equations

   b. Common/MODEF/EM,DM,X,Y,J1,J2

      1) EM =mode output

      2) DM =derivative = output

      3) X =value of x (input)

      4) Y =value of y (input)

      5) J1 =wing number (input)

      6) J2 =mode number (input)

5. Calling Sequence:

   Call MFUN (JMODE)

6. Subroutine User: RDMODE

1. Subroutine Name: MXERR

2. Purpose:

Whenever a program limit has been exceeded, this subroutine will write an error message to inform the user.

3. Input Arguments:

IERR	=	identifies error
MXNO	=	program limit
NOIN	=	value in error
I6	=	output tape for printing

4. Calling Sequence:

```
Call MXERR(IERR,MXNO,NOIN, I6)
```

5. Output:

An error message is printed for the following parameters if their limit is exceeded:

Number wings

Number sections

Number modes

Number spaces

Number corner points

Number frequencies

Number elements/span

1. Subroutine Name: OUTP1

2. Purpose:

   To output the LIFT AND PRESSURE MOMENT PER UNIT SPAN FOR WING - and the VELOCITY POTENTIALS AND ELEMENT PRESSURES FOR WING - tables.

3. Equations and Procedures:

   Information is printed out in tabular form.

4. Input Arguments:

   Defined by comment statements at the beginning of subroutine.

5. Output Arguments: None

6. Common Blocks: None

7. Error Returns: None

8. Calling Sequence:

   Call OUTP1 (MACH,FREQ,JMODE,JWING,NS,NSP,SW,DLSPAN,PMSPAN, XP,INDXI,PRES,IPW,I6,LINE,LMAX,NNCH,NE,TITLE,NSPT)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 650 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: OUTP2

2. Purpose:

   Print the Total Lift and Pitching Moment tables.

3. Equations and Procedures:

   Information is printed out in tabular form.

4. Input Arguments:

I6	Logical unit number of output device (printer)
NWING	number of wings in structure
TL(I,J)	Total lift on wing I due to mode J
TM(I,J)	Total moment on wing I due to mode J
JMODE	Total number of modes for run
FREQ	Frequency
MACH	Mach number
LINE	Current line count
LMAX	Maximum number of lines per page

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   Call OUTP2 (I6,NWING,XP,TL,JMODE,FREQ,MACH,LINE,LMAX)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 260 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: OUTP3

2. Purpose:

Write the table of GENERALIZED AERODYNAMIC COEFFICIENT MATRIX IN AGARD DEFINITION.

3. Procedure:

Information is printed out in tabular form.

4. Input Arguments:

I6	Logical unit number of printer
MACH	Mach number
FREQ	Frequency
Q	Aerodynamic coefficient matrix
LINE	Current line
LMAX	Total number of lines allowed on page
TITLE	Print title information, 4 characters per word, 56 characters in total

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

Call OUTP3 (I6,MACH,GREQ,JMODE,Q,LINE,LMAX,TITLE)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 430 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: PHIL

2. Purpose: Integration of velocity potentials.

3. Equations and Procedure:

The velocity potentials are integrated separately for each span. The equation and method is given in detail in Reference #1. This routine also determines the convergence of the velocity potentials when wake effect is considered.

4. Input Arguments:

XLE	X coordinate of the center of the leading edge line for the span.
XCEN	X coordinates of the center of the elements of the span.
DPDX	Functional values to be integrated (COMPLEX).
NEPS	The number of elements per span.
A	Complex constant used as exponent. A = (0.0, K'*M).
CXP	Complex expotentials taken at the center of the element. CXP(I) = CEXP (0.0,XCENLI)*K'*M).

5. Output Arguments:

PHI	Velocity potential for the span.
PHIW	This array is used as both input and output to test for wake convergence. On input it is the velocity potential of the last iteration. On output it is identical to PHI.

6. Common Blocks Used: /WAKE/

7. Error Returns: None

8. Calling Sequence:

   Call PHIL(XLE,XCEN,DPDX,NEPS,PHI,A,CXP,PHIW)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 914 words

13. Subroutines Required: None

14. Subroutine User: MAIN

15. Remarks: None

1. Subroutine Name: PLOT

2. Purpose:

This routine positions the pen of the plotter and skips plot frames on the CDC version of the plotter.

3. Equations and Procedure

The Langley plotting routines, CALPLT and NFRAME, are called in place of the standard CALCOMP routine PLOT.

4. Input Arguments

X, Y, IPEN These are the arguments of the standard CALCOMP routine PLOT.

5. Output Arguments: None

6. Common Bocks Used: None

7. Error Returns: None

8. Calling Sequence:

Call PLOT(X,Y, IPEN)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: Relatively small

13. Subroutines Required: CALPLT, NFRAME

14. Subroutine User: PLOTGD

15. Remarks:

This routine is not used in the IBM version of the program. Instead, the standard CALCOMP routine PLOTS, with entry point PLOT is used.

1. Subroutine Name: PLOTGD

2. Purpose:

Generate a plot of each section of a wing.

3. Equations and Procedure:

Standard CALCOMP plotting techniques are used.

4. Input Arguments:

NE	Number of elements in each section of the wing
XYZ	X and Y coordinates of each element (aerodynamic Reference System)
NNCH	Array containing last element number of each span
NSP	Number of spans in each section of the wing
NSECT	Number of sections in the wing
TITLE	56 characters of title information. 14 words, 4 characters in each word
JWING	wing number
ZSECT	Z coordinate of all elements in the section
AR	Aspect Ratio
MACH	Mach Number

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

```
Call PLOTGD(NE,XYZ,NNCH,NSP,NSECT,   TITLE,JWING,ZSECT,AR,MACH)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 740 words

13. Subroutine Required:

This routine requires the following CALCOMP routines:

NUMBER, SYMBOL, LINE, PLOT

14. Subroutine User: MAIN

15. Remarks: None

1. Subroutine Name: PTGRID

2. Purpose:

To print out the aerodynamic grid and calculate the X coordinate of the center of each element.

3. Equations and Procedure:

The coordinates of each point are found in the structural reference (or rotated structural reference) system. These are then printed out in tabular form along with the X and Y coordinates of the center of the element. The X coordinate of the center of the element is stored (in the aerodynamic system) in the array XCEN.

4. Input Arguments:

I6	Logical unit number of output device.
TITLE	Array containing title information (56 characters, 14 words, 4 characters each).
MACH	Mach number
NWING	Number of wings
NØECT	Number of sections in each wing.
NØP	Number of spans in section I of wing J-NØP(I,J).
NNCH	Array containing the element number of the last element of each span.
XYZ	X and Y coordinates of the structure in the aerodynamic system.
ZØECT	Z coordinates of each section.
REFLEN	Input reference length.
BEETA	BEETA=SQRT(MACH**2-1.0).

5. Output Arguments:

   XCEN X coordinates of the center of each element

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   Subroutine PTGRID (I.6,TITLE,MACH,NWING,NSECT,NSP,NNCH,XYZ, ZSECT,REFLEN,BEETA).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 406 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: RDETA

2. Purpose:

   Read DETADX, ETA arrays from Tape I13

3. Input Arguments:

   I13 = Tape number

   NET = number of elements

4. Output Arguments:

   DETADX = array on tape I13

   ETA = array on tape I13

5. Scratch Tapes: I13

6. Subroutine User:

   Main program

7. Calling Sequence:

   Call RDETA (I13,DETADX,ETA,NET)

1. Subroutine Name: RDMØDE

2. Purpose:

Read and define modal input.

3. Equations and Procedure:

Mode type of input is determined. (MDWING or MDPØLY)
If MDPØLY is present, the coefficient of the polynomials are read, and the modal values and their derivatives at each element is found using MFUN. If MDWING data is present, the spline routine obtained from Robert Desmarais, is used. Cards from program ØØ31 are read by subroutines
READAB and READXY. Note that this routine is really ZFUN with minor changes. The next data card is read. If it is another MDWING card, the above procedure is repeated. If it is a RIGM card, the rigid mode data is read. This is done until an END card is reached.

4. Input Arguments:

NWING	Number of wings in structure
NØECT	Number of sections in each wing.
NE	Number of elements in each section of each wing.
XCEN	X coordinate of the center of each element in the aerodynamic grid in the aerodynamic reference system.
XYZ	X and Y coordinates of the structure in the aerodynamic system.
BEETA	ØQRT(MACH*MACH-1.0)
REFLEN	Reference length

NET	Total number of elements.
LAB	Label on last card read.
ID	Integer field of last card read.
I5	Unit number of device containing the input deck.
I6	Unit number of device for printout.

5. Output Arguments:

ETA	The modes, for all modes and all elements.
DETADX	The derivative of the mode at every point.
ERRØR	Logical variable set equal to .TRUE. if an error is encountered.

6. Common Blocks Used:

/MCØM/

/MØDEF/

/XYSCAL/

7. Error Returns:

The program returns the logical variable ERRØR equal to .TRUE. if an error condition is present in reading the input.

8. Calling Sequence:

Call RDMØDE(JMØDE,NWING,NSECT,NE,XCEN,XYZ,BEETA,REFLEN,NET, LAB,ID,ERRØR,ETA,DETADX,I5,I6).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 1896 words

13. Subroutines Required:

ZFDZ, READAB, MFUN and READXY.

14. Subroutine User: MAIN

15. Remarks: None

1. Subroutine Name: READAB

2. Purpose:

To read in the spline coefficients used for finding mode information.

3. Equations and Procedure:

This reads in the surface spline coefficients and the modal values as punched from program ØØ31. This program was received from and written by Robert Desmarais. The modes are read and used only to see if the mode is constant for all points in the grid. For this reason the modes and the spline coefficients may have the same storage unless the user of the routine wishes to use both the modal values at the structural grid and the spline coefficients.

4. Input Arguments:

Z	Storage to read in modal values.
A	Storage to read in surface spline coefficients.

5. Output Arguments:

Z	Modal values for the structural grid.
A	Surface spline coefficients.

6. Common Blocks Used:

/ZFUNNY/ and /ZFDZIØ/

7. Error Returns: None

8. Calling Sequence:

CALL READXY(Z, A)

(Note that if the modes at the structural grid are not of interest, Z may share the same storage as A).

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 230 words

13. Subroutines Required: None

14. Subroutine User: RDMØDE

15. Remarks:

This subroutine corresponds to entry point READZAB of the function subprogram ZFUN written by Robert Desmarais of Langley Research Center. READAB is to be used in conjunction with subroutines READXY and ZFDZ.

1. Subroutine Name: READXY

2. Purpose:

   To read in the structural grid used for spline data.

3. Equations and Procedure:

   This reads in the structural grid for the spline routine. This is a modified version of subroutine ZFUN. It reads in the number of points in the structural grid and the X and Y coordinates of the structural grid, exactly as it was punched from Program ØØ31. (ØØ31 was written by Robert Desmarais of Langley Research Center).

4. Input Arguments: None

5. Output Arguments:

   X — X coordinates of the structural surface.

   Y — Y coordinates of the structural surface.

6. Common Blocks Used: /ZFUNNY/ and /ZFDZIØ/

7. Error Returns

   IERF is set equal to 680 if the number of points to be read exceeds the maximum allowed by the program. IERF is in common /ZFUNNY/

8. Calling Sequence

   CALL READ(X,Y)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 210 words

13. Subroutines Required: None

14. Subroutine User: RDMODE

15. Remarks:

This subroutine corresponds to entry point READZXY of the function subprogram ZFUN, written by Robert Desmarais. READXY is to be used in conjunction with subroutines READAB and ZFDZ.

1. Subroutine Name: RØTART

2. Purpose:

Read and check restart tape.

3. Equations and Procedure:

The first record of the "restart" tape is read and compared against the current run. If the tape is compatible with the current run, execution proceeds. If not, a table is printed out giving the information on the restart tape and for the current run. If wake elements are requested, this same test is made on the wake effect tape, I15.

4. Input Arguments:

MACH	Mach number
NET	Total number of elements
NFREQ	Number of frequencies
FREQ	List of frequencies
REFLEN	Reference length
IWTE	Wake effect code
I8	Logical unit number of restart tape containing velocity influence coefficients.
I15	Logical unit number of restart tape containing wake effects.
I6	Logical unit number of output device.
FREQR	Space used to read frequencies from restart tape.
XYZ	X and Y coordinates of elements.

5. Output Arguments

AREA	Area of each element.

6. Common Blocks Used

/NEXTCØ/ (see Error Returns)

7. Error Returns

IFLUØH in CØMMØN/NEXTCØ/ is set equal to 1 if either one of the restart tapes are not compatible with the present run. This forces termination of the program. The program will not cycle to the next case to avoid writing over the restart tape.

8. Calling Sequence:

Call RØTART(MACH,NET,NFREQ,FREQ,REFLEN,IWTE,I8,I15,I6,FREQR, XYZ,AREA).

9. Input Tapes:

Logical unit I8 and I15, the restart tapes. I15 is optional and needed only when wake is required in the current run.

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 450 words

13. Subroutines Required: None

14. Subroutine User: MAIN

15. Remarks: None

1. Subroutine Name: RTOI

2. Purpose:

This routine transforms a pair of coordinates from the reference system of the receiving element to the reference system of the influencing system.

3. Equations and Procedures:

The point is first transformed from the receiving system to the reference system. This new set of coordinates is then put in the influencing system. The transformation matrix to relate the velocity influence from the influencing system to the receiving system is also defined.

4. Input Arguments:

TR Transformation matrix to go from receiving system to the reference system.

TI Transformation matrix to go from the influencing system to the reference system.

YCR Y coordinate in the receiving system.

XCR Z coordinate in the receiving system.

5. Output Arguments:

ZRO Z coordinate of the receiving point in the influencing system.

ZLO Z coordinate of the mirror image of the receiving point in the influencing system.

6. Common Blocks Used:

/RRLL/

7. Error Returns: None

8. Calling Sequence:

   Call RTOI (TR,TI,YCR,ZCR,ZRO,ZLO)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 200 words

13. Subroutines Required: None

14. Subroutine User: LOOPW

15. Remarks: None

1. Subroutine Name: SOLVE

2. Purpose:

Solution of the linear system of equations C*X = B.

3. Equations and Procedure:

Back substitution based on the factored form of the coefficient matrix. See Algorithm 423, "Collected Algorithms from CACM", by Cleve Moler.

4. Input Arguments:

N	Order of the Matrix A
NDIM	First dimension of a declared in calling program. If A is singly subscripted in calling program, SFT NDIM-N.
A	Contains the triangular factors of the matrix C (as determined by subroutine "DECOM").
B	On input, the RHS vector
IP	Vector of dimension N containing Row interchange information (as determined by subroutine "DECOM").

5. Output Arguments:

B	The solution vector

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

```
Call SOLVE(N,NDIM,A,B,IP)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 249 words

13. Subroutines Required: None

14. Subroutine User:

MAIN

15. Remarks:

Subroutine SOLVE must be used in conjunction with subroutine DECOM.

1. Subroutine Name: SONS

2. Purpose:

Determines if the elements of one section influence the elements of any other section.

3. Equations and Procedure:

Each section is treated as having two receiving points and two influencing points. The receiving points are then taken to be the corner at the trailing edge of the section. The influencing points are the corner points of the section at the leading edge. Each section is examined to see if any other sections "influencing points" have any influence on its receiving points. The Boolean matrix ISONS(K1,K2) is determined such that ISONS(K1,K2)=1 if section K2 has influence of section K1, ISONS(K1,K2) = 0 if section K2 has no influence on section K1.

4. Input Arguments:

NWING Number of wings

NSECT Number os sections in each wing

CORNX, CORNY, CORNZ Array of X,Y, and Z coorindates for the wing corner points

5. Output Arguments:

ISONS See Equations and Procedures section above.

7. Common Blocks Used: None

8. Calling Sequence:

```
Call SONS(NWING,NSECT,CORNX,CORNY,CORNZ,ISONS)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 430 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: ØØNØPT

2. Purpose:

   Print out a table to show if any section is influenced by any other section.

3. Procedure:

   IØØNØ (see Subroutine ØØNØ write-up) is printed in tabular form.

4. Input Arguments:

IØØNØ	See write up, (Equations and Procedure Section) for Subroutine ØØNØ.
NWING	Number of wings.
NØECT	Number of sections in each wing.
MACH	Mach number (REAL)
I6	Logical unit number of prints.

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   Call ØØNØPT(IØØNØ,NWING,NØECT,MACH,I6)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 325 words

13. Subroutine User: MAIN

14. Subroutine Required: None

15. Remarks: None

1. Subroutine Name: SYMBOL

2. Purpose:

   To plot character information in the CDC version of the program.

3. Equations and Procedure

   This routine calls the Langley plotting routine NOTATE.

4. Input Arguments:

   The input arguments are identical to either the standard CALCOMP routine SYMBOL or the Langley plot routine NOTATE.

5. Output Arguments: None

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

   Call SYMBOL (X,Y,SIZE,CHAR,ANG,NCHAR)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: None

13. Subroutine Required: NOTATE

14. Subroutine User: PLOTGD

15. Remarks:

    This routine is only used in the CDC version of the program. In the IBM version, this routine is replaced by the standard CALCOMP routine SYMBOL.

1. Subroutine Name: TIMOUT

2. Purpose:

To print in tabular form the elapsed time from the last call to this routine.

3. Equations and Procedure:

Procedure is fairly obvious. Note that eight scalars are used to receive title information. Scalars were used instead of an array to permit the same routine to be used on both the CDC and IBM machines. Scalars were needed because of the different word length of the two machines.

4. Input Arguments:

MSEC	Integer value of current elapsed time in milliseconds.
A, B, C, D, E, F, G, and H	Eight scalars used to input 4 characters of title information each.

5. Output Arguments: None

6. Common Blocks Used:

/TAPE/

7. Error Returns: None

8. Calling Sequence:

```
Call TIMOUT(MSEC,A,B,C,D,E,F,G,H)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 124 words

13. Subroutine Required: None

14. Subroutine User: MAIN

15. Remarks:

This routine prints the time on logical unit J9, the seventh scalar (integer) in COMMON/TAPE/. It is suggested that this output device be separate from the output device of the rest of the run.

1. Subroutine Name: TMAX

2. Purpose:

   1. Generate maximum value in array.
   2. Test each element in the array and determine whether it is zero relative to the maximum.
   3. Let element = 0.0 if it is relatively = 0.0.

3. Input Requirements:

   NET = number elements in array

   A = array of real numbers

4. Output Arguments:

   A = array which has been set equal to zero in those locations which the original element = relatively small.

   GBAR = maximum value

5. Subroutine User: ITRATE

6. Calling Sequence:

   Call TMAX (NET,A,GBAR)

7. Subroutine Used: CABSO

1. Subroutine Name: TRANS

2. Purpose:

To find the transformation matrix to transform coordinates from one rectangular system to another. This routine is used to find the transformation matrix from the reference system of the section to the main reference system.

3. Equations and Procedure:

The equations are found in Reference 1.

4. Input Arguments:

X,Y,Z X,Y,Z coordinates of the corner points of the structure

5. Output Arguments

XP,YP X and Y coordinates of the corner points of the section in the local reference system of the section

ZC The local Z coordinate of all points in the section

6. Common Blocks Used: None

7. Error Returns: None

8. Calling Sequence:

Call TRANS (X,Y,Z,T,XP,YP,ZC)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 266 words

13. Subroutines Required: None

14. Subroutine User:

MESH, MESHCL and GRIDIN

15. Remarks: None

1. Subroutine Name: WAKET

2. Purpose:

Write Wake element effects on tape I12 for 1 frequency

3. Input Arguments:

FRQ = frequency

I12 = output tape number

IF = frequency number

LRECLW = length of record on tape I8

K1 = number frequencies

4. Output Arguments:

IZ = non zero elements in record

AROW = elements selected for given frequency stored on tape I12

WROW = record from tape I8 containing wake effects coefficients

NNCH = row numbers of trailing edge elements

5. Calling Sequence:

Call WAKET (I12,AROW,WROW,IF,LRECLW,NSPT,I8,IZ,K1,NNCH,FRQ)

6. Files:

I12 Output tape containing effects for 1 frequency

I8 input tape contains effects for all frequencies

7. Subroutines Used: WRITZW

8. Subroutine User: DIAG

9. Calling Sequence:

Call DIAG (WROW,IF,LRECL,NNCH,MC,D,NET,AROW,IZ,IP,NSPT,
FRQ,CWROW,CAROW)

10. Common Blocks:

COMMON/TAPE/ Defines tape storage

COMMON/VELCOM/ NW block and NWROW

COMMON/WAKE/ Defines wake effect controls

COMMON/WAKEUP Defines wake effects variabiles

11. Files:

I9 =Input file containing W coefficients

I15=Input file containing Wake effects

I10=Output file containing D block compound

I11=Output file containing block off diagonals

I12=Output file containing WAKE effects

12. Subroutines Used:

1. FREQW
2. WAKET
3. WRITED
4. DECOM

1. Subroutine Name: WINGCK

2. Purpose:

Check on the validity of the corner points of a wing.

3. Equation and Procedure

The corner points of a given wing are checked in pairs. The leading corner point must have an X coordinate that is less than or equal to the trailing corner point. The Y and Z coordinates of the leading corner point must be the same as the Y and Z coordinates of the trailing corner point, respectively

4. Input Arguments

CORNX, CORNY, CORNZ	Input X, Y, and Z coordinates of the wing
NWING	Wing number, used in error message printout
ICN	Number of corner points
I6	Logical unit number of output device

5. Output Arguments

ERROR	Error code, set equal to .TRUE. if an error condition exists.

6. Common Blocks Used: None

7. Error Returns:

See Equations and Procedure and definition of ERROR above.

8. Calling Argument:

```
Call WINGCK(CORNX,CORNY,CORNZ,NWING,ICN,ERROR,I6)
```

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 175 words

13. Subroutines Required: None

14. Subroutine User: WINGIN

15. Remarks: None

1. Subroutine Name: WINGIN

2. Purpose:

To read and check the geometric input. All geometric input label cards with the exception of the SPAN and CHORD sections are read here.

3. Equations and Procedure:

Each label card is read with the same format: READ (I5,1000) LAB,ID,FD; 1000 FORMAT (A4,2X,9I2,4E12.0), where ID and FD are dimensional 9 and 4 respectively. The program then branches to the section that processes that label section.

4. Input Arguments:

I5	Logical unit number containing the input deck - usually the card reader
I6	Logical unit number of the output unit. Usually the system printer
BEETA	SQRT (MACH*MACH-1)
REFLEN	Reference length

5. Output Arguments:

NWING	Number of wings in structure
NSECT	Array containing the number of sections for each wing
AR	Aspect ratio of each wing - array
NSP	NSP(I,J) is the number of spans for section I of wing J
CORNX) CORNY) CORNZ)	The X, Y, and Z coordinates of the corner points of each wing XORNX(I,J) is the X coordinate of corner point I of wing J.

SYM	Array, SYM(J) is the symmetry code of wing J
ICL	Code for section I of wing J ICL(I,J) = 1, specific grid information is input. ICL(I,J) = 0, MESH generated, no control lines. ICL(I,J) = 1, or 2, MESH generated with 1 or 2 control lines.
CL	X coordinate of control lines for each section. CL(K,I,J) for section I of wing J. K = 1, and 2 for first and second coordinates of first control line of the section. K = 3, 4 for first and second coordinates of second control line in section.
IWP	Print control for each wing
ERROR	Set equal to .TRUE. if an error is found.
NFREQ	Number of frequencies
FREQ	List of frequencies
LAB	Label of last card read
ID	Integer field of last card read
FD	Floating point field of last card read

6. Common Blocks Used: None

7. ERROR Returns:

Logical ERROR is set equal to .TRUE. if any of several errors exist in reading the input. The error condition generates an appropriate error message. All error message format statements are numbered between 2000 and 2022. (All messages are preceeded by the statement ERROR IN READING INPUT.)

Messages a through f have to do with errors on the WING data card, and are preceeded by the message:

WING DATA CARD IS INCORRECT.

a) DATA FOR WING - WAS READ WHEN DATA FOR WING - WAS EXPECTED BY THE PROGRAM.
(WING data cards must appear in consecutive order in the deck. Each WING data card is the first card of a WING data group.)

b) WING NUMBER MUST BE GREATER THAN ZERO AND LESS THAN OR EQUAL TO 4. IT WAS READ AS ___. IT WILL BE TREATED AS WING 1 FOR CHECK PURPOSE ONLY.

c) NO MORE THAN FOUR WING DATA CARDS MAY BE INPUT.

d) THE NUMBER OF SECTIONS INPUT FOR WING __ IS .
THIS IS GREATER THAN THE MAXIMUM PER WING OF 3.

e) NUMBER OF CORNER POINTS, __ IS NOT CONSISTANT WITH THE NUMBER OF SECTION __ FOR WING __.
(A wing with 1 section may have only 3 or 4 corner points. A wing with 2 sections, 5 or 6 corner points. A wing with 3 sections, 7 or 8 corner points.)

f) SYMMETRY CODE FOR WING __, IS INPUT AS _____.
SYMMETRY CODE MAY ONLY EQUAL -1, 0, OR 1.

g) "CORNER" DATA CARD IS MISSING FOR WING _____.
(The CORNER cards defining a wing must immediately follow the WING card for that wing.)

Messages h through l have to do with eerors on the LINE data card.

They are preceeded by the following message

ERROR ON CONTROL "LINE" DATA CARD FOR WING ____.

h) MORE THAN TWO CONTROL LINES ARE SPECIFIED FOR SECTION ____.

i) CONTROL LINES ARE NOT INPUT IN ORDER FOR SECTION ____.

j) CONTROL LINE IS SPECTIFIED FOR SECTION ___ OF WING ___. THIS WING HAS _____ SECTIONS (CONTROL LINE IGNORED).

k) CONTROL LINE ___ FOR SECTION ____ IS NOT DEFINED TO BE INSIDE OF THE SECTION.

l) CONTROL LINE 2 OF SECTION ____ IS ABOVE THE FIRST CONTROL LINE.(In a section with 2 control lines, the leading control line must always be defined first and designated as control line number 1).

m) MODE DATA IS MISSING OR OUT OF ORDER.

n) FREQUENCY DATA IS MISSING OR OUT OF ORDER.

o) A LABEL CARD IS EXPECTED BUT NOT PRESENT. CARD WILL BE PRINTED ON THE FOLLOWING LINE AND THE NEXT CARD WILL BE READ.

p) ERROR ON GRID LABEL CARD GRID DATA PRESENT FOR WING ___.
SECTION ____
THIS SECTION HAS NOT BEED DEFINED FOR THE STRUCTURE.

8. Calling Sequence:

Call WINGIN(I5,I6,NWING,NSECT,AR,NSP,CORNX,CORNY,CONRZ, SYM,ICL,CL,ERROR,BEETA,IPW,NFREQ,FREQ,REFLEN,LAB,ID,FD)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 2022

13. Subroutine User: MAIN

14. Subroutine Required: WINGCK

15. Remarks: None

1. Subroutine Name: WINTGR

2. Purpose:

To organize the computation of velocity influence coefficients of a pair of elements.

3. Equations and Procedure:

The influence of a single line and its mirror image is determined with respect to a given receiving point. This influence is combined with the influence of the preceeding (lower) line in the span, (if any). Subroutine EØNE is used to determine if there is any influence at all, and subroutine WVINT calculates the frequency independent terms. Wake effects are also calculated.

4. Input Arguments:

X,Y	X and Y coordinates of points of the influencing element.

5. Output Arguments:

WRØW	Array of influence coefficients for all frequencies.

6. Common Blocks Used:

/EEW/

/EXCEED/

/FQ1/

/FKTEST/

/RRLL/

/WAKE/

/WAKEUP/

/WV1/

/WW1/

7. Error Returns: None

8. Calling Sequence:

   Call WINTGR(X,Y,WRØW)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 1630 words

13. Subroutine Required: WVINT

14. Subroutines User: LØØPW

15. Remarks: None

C-2

1. Subroutine Name: WRETA

2. Purpose of Procedures:

   WDETA, WETA arrays are stored on tape I13 - each mode is a row.

3. Input Arguments:

   NET = no. of elements

   JMODE= no. modes

   WDETA= WDETA array

   WETA = WETA array

   I13 = tape no.

4. Calling Sequence:

   Call WRETA(NET,JMODE,WDETA,WETA,I13)

5. Scratch Tapes: I13

6. Subroutine User: MAIN program

1. Subroutine Name: WRITEO

2. Purpose and Procedures:

Test for nonzero elements in a row and store the nonzero elements and the corresponding row numbers on tape. The record is not written if NNZ = 0.

3. Input Arguments:

K = row numbers

AROW = array of numbers to be tested

NET = total number elements

4. Output Arguments:

IZ = array containing row numbers of nonzero element.

ANEW=array of nonzero elements

5. Calling Sequence:

Call WRITEO (K,AROW,IZ,ANEW,NET)

6. Scratch Tapes:

I11 = tape on which records are written

7. Subroutines Required:

WRITZ

8. Subroutine User: DIAG

9. Common Blocks:

/TAPE/I9,I10,I11

1. Subroutine Name: WRITZ

2. Purpose:

Write nonzero elements of coefficient matrix

3. Equations and Procedures:

WRITE (I12), K,NNZ,IZ,ANEW

4. Input Arguments:

I11 = tape number

K = row number

NNZ = number nonzero element numbers

IZ = array of element number

ANEW = nonzero elements of W. This array is real

5. Calling Sequence:

Call WRITZ(I11,K,NNZ,IZ,ANEW)

6. Scratch Tape:

I11 = output tape containing ANEW records

7. Subroutine User: WRITEO

8. Remarks:

This subroutine is different from WRITZW because ANEW is real.

1. Subroutine Name: WRITZW

2. Purpose:

Write records for wake element coefficient matrix

3. Equations and Procedures:

Write (I12) K,NNZ,IZ,ANEW

4. Input Arguments:

I12 = tape number

K = row number

NNZ = number of nonzero element numbers

IZ = array of element number

ANEW = nonzero elements of WTE. This array is complex.

5. Calling Sequence:

Call WRITZW (I12,K,NNZ,IZ,ANEW)

6. Scratch Tapes:

I12 = output tape containing ANEW records.

7. Subroutine User: WAKET

8. Remarks:

This subroutine is different from WRITZ because ANEW is complex.

1. Subroutine Name: WTEPHT

2. Purpose:

Generate wake effect in computation of dn/dt.

3. Equations and Procedures:

$dn/dt = dn/dt - W_{TE}\emptyset$

a) IZ and W_{TE} are read from tape I12

b) If the record is appropriate for the desired element, the nonzero terms are determined from the IZ array.

c) W_{TE} is post multiplied by $\emptyset$ elements and subtracted from DEDT.

d) The result from step c) is stored back on DEDT.

Steps a), b), c), and d) are repeated for each element.

4. Input Arguments:

DEDT = dh/dt array

NET = number of elements

PHIW = $\emptyset$ array of length NET

I12 = tape containing W_{TE} arrays

W_{TE} = W_{TE} work array - only nonzero terms

5. Output Arguments:

DEDT = revised dn/dt

6. Error Return: None

7. Calling Sequence:

Call WTEPHT(DEDT,NET,PHIW,IZ,I12,WTE)

8. Scratch Tapes:

I12 = tape containing NET records.

Each record is of form:

KEL,NNZ,IZ,WTE.

9. Common Statements: None

10. Subroutine User: MAIN

11. Subroutines Required: None

1. Subroutine Name: WVINT

2. Purpose:

   To evaluate the velocity influence of a line on a point.

3. Equations and Procedure:

   The equations for this section are given in Reference 1. A Gaussian quadrature is used to evaluate the higher order terms of the H expressions.

4. Input Arguments: None

5. Output Arguments: None

6. Common Blocks Used:

   /EEW/

   /WVI/

   /WWI/

7. Error Returns: None

8. Calling Sequence:

   Call WVINT

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 1384 words

13. Subroutine Required: None

14. Subroutine User: WINTGR

15. Remarks: None

1. Subroutine Name: ZFDZ

2. Purpose:

   To evaluate modal functions and its derivatives.

3. Equations and Procedure:

   This subroutine is a modified version of ZFUN, the routine written by Robert Desmarais of Langley Research Center. It calculates the modal values and the derivative for 1 aerodynamic grid point and one mode, given the coordinates of the structural grid system and the surface spline coefficients.

4. Input Arguments:

X, Y	Structural grid coordinates
A	Surface spline coefficients

5. Output Arguments

ZFUN	Modal value at aerodynamic grid point
DZDX	Derivative of the function (modal value) at the aerodynamic grid point.

6. Common Blocks Used:

   /XY$CAL/ and /ZFUNNY/

7. Error Returns: None

8. Calling Sequence:

   CALL ZFDZ(ZFUN, DFDZ, X, Y, A)

9. Input Tapes: None

10. Output Tapes: None

11. Scratch Tapes: None

12. Storage Required: 151 words

13. Subroutines Required: None

14. Subroutine User: RDMØDE

15. Remarks:

This subroutine corresponds to the main entry of the function subprogram ZFUN, written by Robert Desmarais. It also includes the evaluation of the derivative done at entry point DZDX of ZFUN. Subroutine ZFDZ is to be used in conjunction with subroutines READXY and READAB. These two subroutines read the spline input data that is punched by program ØØ31. (Program ØØ31 was also written and received from Robert Desmarais).

Section 6
Source Program Listings

The source program listings for each subroutine are included in this section. The routines are indexed by deck number. A list of deck names and numbers can be found on the next page.

The program consists of 51 subprograms each with a unique sequence number. Columns 73, 74, 75 contain the "Deck" number and columns 76 through 80 contain the card sequence number for that subprogram. The first card is always ----0010 - with successive increments of 10.

Subroutine Deck Numbers

Name	Deck No.	Name	Deck No.
MAIN	1	PLOTGD	26
BLOCK	2	PTGRID	27
CABSO	3	RDETA	28
DECOM	4	RDMODE	29
DIAG	5	READAB	30
ECHO	6	READXY	31
EFPLOT	7	RSTART	32
EONE	8	RTOI	33
FGEN	9	SOLVE	34
FREQW	10	SONS	35
GETTIM	11	SONSPT	36
GRIDIN	12	SYMBOL	37
INP1	13	TIMOUT	38
IRELE	14	TMAX	39
ITRATE	15	TRANS	40
LOOPW	16	WAKET	41
MESH	17	WINGCK	42
MESCL	18	WINGIN	43
MFUN	19	WINTGR	44
MXERR	20	WRETA	45
OUTP1	21	WRITEO	46
OUTP2	22	WRITZ	47
OUTP3	23	WRITZW	48
PHIL	24	WTEPHT	49
PLOT	25	WVINT	50
		ZWDZ	51

DISPLAY...FILE DECK 01

```
LINE    1  C       MAIN                                                                  00100010
LINE    2  C    CONSTANT POTENTIAL GRADIENT METHOD                                       00100020
LINE    3  C      CHANGE STORAGES TO  300,70,100  FROM 200, 40,  50                     00100030
LINE    4         COMPLEX  CAROW(100)                                                   00100040
LINE    5         COMPLEX  CE, PRES(300)                                                00100050
LINE    6         COMPLEX CFREQ                                                         00100060
LINE    7         COMPLEX  CWROW ( 1200)                                                00100070
LINE    8         COMPLEX CXKM                                                          00100080
LINE    9         COMPLEX  CXP(300)                                                     00100090
LINE   10         COMPLEX  DCWORK( 901)                                                 00100100
LINE   11         COMPLEX DEDT,DPDX                                                     00100110
LINE   12         COMPLEX  DLS,PMS,DLOAD                                                00100120
LINE   13         COMPLEX  DLSPAN(100),PMPSPN(100)                                      00100130
LINE   14         COMPLEX   ESWRKC(1)                                                   00100140
LINE   15         COMPLEX  GT(300)                                                      00100150
LINE   16         COMPLEX Q(10,10)                                                      00100160
LINE   17         COMPLEX  PHI(70)                                                      00100170
LINE   18         COMPLEX  PHIW(300)                                                    00100180
LINE   19         COMPLEX  SWORKC( 1671 )                                               00100190
LINE   20         COMPLEX TL(4,10), TM(4,10)                                            00100200
LINE   21         COMPLEX  WTE( 100)                                                    00100210
LINE   22         COMPLEX  WTEROW(1200)                                                 00100220
LINE   23         COMPLEX  WTES                                                         00100230
LINE   24         COMPLEX  WW( 300)                                                     00100240
LINE   25         REAL IBUFF                                                            00100250
LINE   26         REAL MACH                                                             00100260
LINE   27         INTEGER PRINT                                                         00100270
LINE   28         INTEGER TAPE8                                                         00100280
LINE   29         LOGICAL ERROR                                                         00100290
LINE   30         LOGICAL PLOTR                                                         00100300
LINE   31         LOGICAL PLOTR1                                                        00100310
LINE   32         LOGICAL TEXCD                                                         00100320
LINE   33         LOGICAL TREDGE                                                        00100330
LINE   34         LOGICAL WAKE,WAKE1,WAKENZ                                             00100340
LINE   35         DIMENSION            AR(4), ISONS(12,12)                              00100350
LINE   36         DIMENSION AREA(300)                                                   00100360
LINE   37         DIMENSION AROW (300)                                                  00100370
LINE   38         DIMENSION CWORK(4529)                                                 00100380
LINE   39         DIMENSION DWORK(3901 )                                                00100390
LINE   40         DIMENSION  D(60,60), IP(60),  DNWR(60), DNWI(60), RWR(60), RWI(60)00100400
LINE   41         DIMENSION DR(300),DI(300),  DPDX(300), DEDT(300)                      00100410
LINE   42         DIMENSION ECWORK(1)                                                   00100420
LINE   43         DIMENSION EDCWRK (1)                                                  00100430
LINE   44         DIMENSION EMISC (1)                                                   00100440
LINE   45         DIMENSION ESWRKR( 1)                                                  00100450
LINE   46         DIMENSION   ETA(300),  DETADX(300)                                    00100460
LINE   47         DIMENSION EWORKM (1)                                                  00100470
LINE   48         DIMENSION  FREQR(12)                                                  00100480
LINE   49         DIMENSION IBUFF(2000)                                                 00100490
LINE   50         DIMENSION ICL(3,4), CL(4,3,4)                                         00100500
LINE   51         DIMENSION ID(9), FD(4)                                                00100510
LINE   52         DIMENSION IPW(4)                                                      00100520
LINE   53         DIMENSION IZ(300)                                                     00100530
LINE   54         DIMENSION LTIME(8)                                                    00100540
LINE   55         DIMENSION  NE(3,4)                                                    00100550
LINE   56         DIMENSION  NSECT(4), CORNX(8,4), CORNY(8,4), CORNZ(8,4), NSP(3,4)  00100560
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LINE   57          DIMENSION NSPWS(4)                                                    00100570
LINE   58          DIMENSION SW(100), XLE(100),NNCH(100)                                 00100580
LINE   59          DIMENSION SWORK( 8444   )                                             00100590
LINE   60          DIMENSION SWORKR(1201   )                                             00100600
LINE   61          DIMENSION SYM(4)                                                      00100610
LINE   62          DIMENSION  TITLE( 24)                                                 00100620
LINE   63          DIMENSION TRS(4,3,4), ZSECT(3,4)                                      00100630
LINE   64          DIMENSION WETA(300,10), WDETA(300,10)                                 00100640
LINE   65          DIMENSION WORKM(10601 )                                               00100650
LINE   66          DIMENSION WROW(3600).                                                 00100660
LINE   67          DIMENSION XCEN(300)                                                   00100670
LINE   68          DIMENSION XYZ (1800).                                                 00100680
LINE   69          DIMENSION   XYZFDZ(300,3)                                             00100690
LINE   70          COMMON/BASIC/MACH,BETA,KAPPA,IPRNT(5).                                00100700
LINE   71          COMMON / FQ1 / NFREQ, CF(12,30), FREQ(12), FREQP(12), FRTEST,NTMXX    00100710
LINE   72          COMMON /ITG/   IGWESS                                                 00100720
LINE   73          COMMON/MXSTOR/ NWINGS,NSECTN,NMODES,NSPANS,NCORNR,NFRQUN,NEPSPN       00100730
LINE   74         1 ,NMXFDZ                                                              00100740
LINE   75  C             MAXIMUM NWINGS     =4                                         00100750
LINE   76  C             MAXIMUM NSECTIONS =3                                          00100760
LINE   77  C             MAXIMUM NMODES     =10                                        00100770
LINE   78  C             MAXIMUM NSPANS     =50                                        00100780
LINE   79  C             MAXIMUM NCORNER PTS = 8                                       00100790
LINE   80  C             MAXIMUM NFREQUENCIES = 12                                     00100800
LINE   81  C             MAXIMUM NELEMENTS / SPAN  =40                                 00100810
LINE   82          COMMON / NEXTGS /  IFLUSH                                           00100820
LINE   83          COMMON/PARAM/ NET                                                   00100830
LINE   84          COMMON  / PEREPS /  PERC                                            00100840
LINE   85          COMMON  /TAPE/ IS,I10,I11,I12,I13,I14,J9,I15                        00100850
LINE   86          COMMON/TIMEP/  ITIME                                                00100860
LINE   87          COMMON /VELCOM/  NMAX,PRINT,NWBLCK,NWROW(20)                        00100870
LINE   88          COMMON /WAKE/ ITWM, ITW, ICNVGW, EPSW, JCNVGW,LRWTE ,INTE           00100880
LINE   89          COMMON/WAKEUP/ WTES(12), TREDGE,WAKE1,WAKE, WAKENZ                  00100890
LINE   90          COMMON / ZFDZIO /  J5, J6                                           00100900
LINE   91          COMMON /ZFUNNY/ N,IERF, B1,B2, B3,NFUNMX                            00100910
LINE   92          EQUIVALENCE  (AROW(1),CAROW(1))                                     00100920
LINE   93          EQUIVALENCE ( MSEC, ITIME(2) )                                      00100930
LINE   94          EQUIVALENCE (CWORK (  1)  ,    NE(1) )                              00100940
LINE   95          EQUIVALENCE (CWORK ( 13)  ,   NSP(1) )                              00100950
LINE   96          EQUIVALENCE (CWORK ( 25)  ,   SYM(1) )                              00100960
LINE   97          EQUIVALENCE (CWORK ( 29)  ,  AREA(1) )                              00100970
LINE   98          EQUIVALENCE( CWORK( 329 ) ,  XCEN  (1) )                            00100980
LINE   99          EQUIVALENCE( CWORK( 629 ) ,  XLE   (1) )                            00100990
LINE  100          EQUIVALENCE( CWORK( 729 ) ,  SW    (1) )                            00101000
LINE  101          EQUIVALENCE( CWORK( 829 ) ,  NNCH  (1) )                            00101010
LINE  102          EQUIVALENCE( CWORK( 929 ) ,  WROW  (1) )                            00101020
LINE  103          EQUIVALENCE( CWORK(4529 ) ,  ECWORK(1) )                            00101030
LINE  104          EQUIVALENCE(DCWORK(   1 ) ,  DLSPAN(1) )                            00101040
LINE  105          EQUIVALENCE(DCWORK( 101 ) ,  PMPSPN(1) )                            00101050
LINE  106          EQUIVALENCE(DCWORK( 201 ) ,  PRES  (1) )                            00101060
LINE  107          EQUIVALENCE(DCWORK( 501 ) ,  WTE   (1) )                            00101070
LINE  108          EQUIVALENCE(DCWORK( 601 ) ,  ETA   (1) )                            00101080
LINE  109          EQUIVALENCE(DCWORK( 751 ) ,  DETADX(1) )                            00101090
LINE  110          EQUIVALENCE(DCWORK( 901 ) ,  EDCWRK(1) )                            00101100
LINE  111          EQUIVALENCE (DWORK(1),  DCWORK(1))                                  00101110
LINE  112          EQUIVALENCE ( DWORK(1), ESWRKC(1))                                  00101120
LINE  113          EQUIVALENCE(DWORK(1),D(1))                                          00101130
LINE  114          EQUIVALENCE(DWORK(3661), DNWR(1) )                                  00101140
LINE  115          EQUIVALENCE(DWORK(3721), DNWI(1) )                                  00101150
LINE  116          EQUIVALENCE(DWORK(3781), RWR(1)  )                                  00101160
LINE  117          EQUIVALENCE(DWORK(3841), RWI(1)  )                                  00101170
LINE  118          EQUIVALENCE  ( SWORK(1), SWORKR (1))                                00101180
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LINE 119        EQUIVALENCE  ( SWORK(1), WORKM  (1))                                  00101190
LINE 120        EQUIVALENCE( SWORK( 1201 ), SWORKC(1) )                               00101200
LINE 121        EQUIVALENCE (SWORKC (1) , Q(1)       )                                00101210
LINE 122        EQUIVALENCE (SWORKC(101), P(1)       ).                               00101220
LINE 123        EQUIVALENCE (SWORKC( 171 ),   PHIW    ( 1). )                         00101230
LINE 124        EQUIVALENCE (SWORKC( 471 ),   DEPW    ( 1) )                          00101240
LINE 125        EQUIVALENCE (SWORKC( 771 ),   DPW     ( 1) )                          00101250
LINE 126        EQUIVALENCE (SWORKC(1071 ),   CXP     ( 1) )                          00101260
LINE 127        EQUIVALENCE (SWORKC(1371 ),   WW      ( 1) )                          00101270
LINE 128        EQUIVALENCE ( SWORKC(1671), ESWRKC(1))                                00101280
LINE 129        EQUIVALENCE ( SWORKR(1   ), DR(1 ) )                                  00101290
LINE 130        EQUIVALENCE (SWORKR( 301 ),   DI      ( 1) )                          00101300
LINE 131        EQUIVALENCE (SWORKR( 601 ),   IZ      ( 1). ).                        00101310
LINE 132        EQUIVALENCE (SWORKR( 901 ),   AROW    ( 1). ).                        00101320
LINE 133        EQUIVALENCE (SWORKR(1201 ),   ESWRKR  ( 1) )                          00101330
LINE 134        EQUIVALENCE (TAPE8,I9)                                                00101340
LINE 135        EQUIVALENCE (WORKM(1   ),AR      (1 ) )                               00101350
LINE 136        EQUIVALENCE (WORKM(5   ),CL      (1 ) )                               00101360
LINE 137        EQUIVALENCE (WORKM(53  ),FD      (1 ) )                               00101370
LINE 138        EQUIVALENCE (WORKM(57  ),ID      (1 ) )                               00101380
LINE 139        EQUIVALENCE (WORKM(66  ),ICL     (1 ) )                               00101390
LINE 140        EQUIVALENCE (WORKM(78  ),TRS     (1 ) )                               00101400
LINE 141        EQUIVALENCE (WORKM(126 ),CORNX   (1 ) )                               00101410
LINE 142        EQUIVALENCE (WORKM(158 ),CORNY   (1 ) )                               00101420
LINE 143        EQUIVALENCE (WORKM(190 ),CORNZ   (1 ) )                               00101430
LINE 144        EQUIVALENCE (WORKM(222 ),ISONS   (1 ) )                               00101440
LINE 145        EQUIVALENCE (WORKM(366 ),ZSECT   (1 ) )                               00101450
LINE 146        EQUIVALENCE (WORKM(378 ),EMISC   (1 ) )                               00101460
LINE 147        EQUIVALENCE (WORKM( 401), XYZ(1))                                     00101470
LINE 148        EQUIVALENCE (WORKM (2201 ),   WTEROW (1)   )                          00101480
LINE 149        EQUIVALENCE (WORKM  (4601 ),   WETA    (1). )                         00101490
LINE 150        EQUIVALENCE (WORKM  (7001 ),   WDETA   (1)   )                        00101500
LINE 151        EQUIVALENCE (WORKM  (10601),   EWORKM (1)   )                         00101510
LINE 152        EQUIVALENCE  (WROW(1),  XYZFDZ(1))                                    00101520
LINE 153        EQUIVALENCE (IBUFF(1), WETA (1))                                      00101530
LINE 154        DATA  I3/6/                                                           00101540
LINE 155        DATA  I5, I6 / 11, 6 /                                                00101550
LINE 156        DATA  LMODE  / 4HMODE /                                               00101560
LINE 157        DATA   ITITLE / 4HTITL /                                              00101570
LINE 158        DATA  LMAX  /  62  /                                                  00101580
LINE 159        DATA TWOPI  /  6.283185308   /                                        00101590
LINE 160        DATA XP  / 0.0 /                                                      00101600
LINE 161  C                                                                           00101610
LINE 162        J5 = I5                                                               00101620
LINE 163        J6 = I6                                                               00101630
LINE 164        PLOTR1= .FALSE.                                                       00101640
LINE 165     4  CONTINUE                                                            00101650
LINE 166        IERR =0                                                               00101660
LINE 167        CALL ECHO (KONTRL)                                                    00101670
LINE 168        IF(KONTRL .EQ. 1) GO TO 10                                            00101680
LINE 169        PLOTR =  .FALSE.                                                      00101690
LINE 170        IFLUSH = 0                                                            00101700
LINE 171        NETSV =0                                                              00101710
LINE 172        CALL GETTIM ( ITIME )                                                 00101720
LINE 173  C          SECTION TO READ AND WRITE INPUT DATA                             00101730
LINE 174  C     ------------------------------------------------------------------    00101740
LINE 175  C                                                                           00101750
LINE 176        ERROR = .FALSE.                                                       00101760
LINE 177        RKEX = 0.0                                                            00101770
LINE 178        NTMAX = 1                                                             00101780
LINE 179        NCVEL = 0                                                             00101790
LINE 180        TEXCO = .FALSE.                                                       00101800
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LINE 181  C      READ( 5, 1006 ) TITLE                                          00101810
LINE 182   6     CONTINUE                                                       00101820
LINE 183         READ ( 15,1006, END =10)  LABEL, TITLE                         00101830
LINE 184  CDC    READ( 15,1006) LABEL, TITLE                                    00101840
LINE 185  CDC    IF( EOF(15) ) 10,8                                             00101850
LINE 186  CDC  8 CONTINUE                                                       00101860
LINE 187         IF (  LABEL .NE. ITITLE )          TO   6                      00101870
LINE 188         WRITE( 16, 2006 ) TITLE                                        00101880
LINE 189  C           NWING  NO. WINGS (BETWEEN 1 AND 4)                        00101890
LINE 190  C                                                                     00101900
LINE 191         CALL INP1( I5, I6, TITLE, ITRUN, MACH, REFLEN, XP, XPIN, PLOTR,00101910
LINE 192        1     LATE,EARO, BEETA, LAB, ID, FD, ERROR )                    00101920
LINE 193         IF ( IFLUSH .NE. 0 ) GO TO 500                                 00101930
LINE 194  C                                                                     00101940
LINE 195         CALL WINGIN( I5, I6, NWING, NSECT, AR,NSP, CORNX, CORNY, CORNZ,00101950
LINE 196        1         SYM, ICL, CL, ERROR, BEETA, IPW, NFREQ, FREQ,         00101960
LINE 197        2              REFLEN, LAB, ID, FD )                            00101970
LINE 198  C                                                                     00101980
LINE 199  C      MAIN 158                                                       00101990
LINE 200         IF(NWINGS .LT.NWING )  GO TO 610                               00102000
LINE 201  C      ---------------------------------------------------------------00102010
LINE 202  C           GENERATE AERO GRID                                        00102020
LINE 203  C                                                                     00102030
LINE 204  C           NET      TOTAL NUMBER OF ELEMENTS IN THE STRUCTURE        00102040
LINE 205  C           NEW      TOTAL NUMBER OF ELEMENTS IN THE WING             00102050
LINE 206  C           NSPT     TOTAL NUMBER OF SPANS IN A WING                  00102060
LINE 207         NSPT = 1                                                       00102070
LINE 208         NET =  0                                                       00102080
LINE 209  C                                                                     00102090
LINE 210         IF(PLOTR)   PLOTR1=.TRUE.                                      00102100
LINE 211  CDC    REPLACES                                                       00102110
LINE 212  CDC    IF(PLOTR1) CALL PSEUDO                                         00102120
LINE 213         IF( PLOTR ) CALL PLOTS( IBUFF, 8000 )                          00102130
LINE 214  C           LOOP ON WINGS  J                                          00102140
LINE 215  C      NWBLDK =0                                                      00102150
LINE 216         DO 20 J=1,NWING                                                00102160
LINE 217  C                                                                     00102170
LINE 218         NSPW = 0                                                       00102180
LINE 219         NEW = 0                                                        00102190
LINE 220         NS = NSECT(J)                                                  00102200
LINE 221         IF(NSECTN .LT. NS   )  GO TO 620                               00102210
LINE 222  C                                                                     00102220
LINE 223  C           LOOP ON SECTIONS OF EACH WING  I                          00102230
LINE 224         DO 19 I=1,NS                                                   00102240
LINE 225  C                                                                     00102250
LINE 226  C           JCN      INDEX TO FOUR CORNER POINTS THAT DEFINE THE SECTION00102260
LINE 227         JCN = 2*I - 1                                                  00102270
LINE 228         NINDEX = 6*(NET&NEW). & 1                                      00102280
LINE 229  C                                                                     00102290
LINE 230  C           BRANCH TO CORRECT MESH GENERATING ROUTINE                  00102300
LINE 231         IF( ICL(I,J) ) 15, 16, 17                                      00102310
LINE 232    15   CALL GRIDIN( CORNX(JCN,J), CORNY(JCN,J),CORNZ(JCN,J), XYZ(NINDEX),00102320
LINE 233        1      ZSECT(I,J), TRS(1,I,J), MACH(NSPT), SW(NSPT), XLE(NSPT),  00102330
LINE 234        2      NSP(I,J), NE(I,J), NETSV, REFLEN, NFREQ, FREQ,            00102340
LINE 235        3             NWING, NSECT, ICL, ERROR, BEETA, LAB, ID, FD, I5, I6 )00102350
LINE 236         GO TO 18                                                       00102360
LINE 237    16   CALL MESH  ( CORNX(JCN,J), CORNY(JCN,J),CORNZ(JCN,J), XYZ(NINDEX),00102370
LINE 238        1      ZSECT(I,J), TRS(1,I,J), MACH(NSPT), SW(NSPT), XLE(NSPT),  00102380
LINE 239        2      NSP(I,J), NE(I,J), NETSV, EARO )                          00102390
LINE 240         GO TO 18                                                       00102400
LINE 241    17   CALL MESHCL( CORNX(JCN,J), CORNY(JCN,J),CORNZ(JCN,J), XYZ(NINDEX),00102410
LINE 242        1      ZSECT(I,J), TRS(1,I,J), MACH(NSPT), SW(NSPT), XLE(NSPT),  00102420
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LINE 243        2     NSP(I,J), NE(I,J), NETSV, ICL(I,J), CL(1,I,J), EARU )          00102430
LINE 244    18  CONTINUE                                                             00102440
LINE 245    C                                                                       00102450
LINE 246        NSPW = NSPW & NSP(I,J)                                              00102460
LINE 247        NSPT = NSPT & NSP(I,J)                                              00102470
LINE 248        NEW = NEW & NE(I,J)                                                 00102480
LINE 249    C         END LOOP ON SECTIONS OF WING                                  00102490
LINE 250      19  CONTINUE                                                          00102500
LINE 251    C                                                                       00102510
LINE 252        NINDEX = 6*NET & 1                                                  00102520
LINE 253    C         JCN     NUMBER OF CORNER POINTS THAT DEFINE THE WING        00102530
LINE 254        JCN = 2*(NSECT(J)-1) & 4                                            00102540
LINE 255        IF(NCORNR .LT. JCN )  GO TO 650                                     00102550
LINE 256        IM = NSPT-NSPW                                                      00102560
LINE 257        IF( PLOTR ) CALL PLOTSD( NE(1,J), XYZ(NINDEX), NNCH(IM), NSP(1,J),00102570
LINE 258       1            NSECT(J), TITLE, J, ZSECT(1,J), AR, MACH )             00102580
LINE 259        NSPWG(J) = NSPW                                                     00102590
LINE 260        NET = NET & NEW                                                     00102600
LINE 261    C         END LOOP ON WINGS                                           00102610
LINE 262     20 CONTINUE                                                          00102620
LINE 263        IF(NFRQUN .LT. NFREQ)  GO TO 660                                    00102630
LINE 264    C   IF( PLOTR ) CALL ENDPLT                                           00102640
LINE 265    C                                                                       00102650
LINE 266        NSPT = NSPT - 1                                                     00102660
LINE 267        IF(NSPANS .LT. NSPT )  GO TO 640                                    00102670
LINE 268    C   WRITE( 6, 1014 ) ( NNCH(I), I=1,NSPT )                           00102680
LINE 269    C   WRITE( 6, 1015 ) ( SW(I), I=1,NSPT )                             00102690
LINE 270    C   WRITE( 6, 1015 ) ( XLE(I), I=1,NSPT )                            00102700
LINE 271    C1014 FORMAT (///  (10I8).)                                          00102710
LINE 272    C1015 FORMAT( // ( / 5E12.4 ) )                                      00102720
LINE 273    C   GENERATE NWROW AND  NWBLCK                                       00102730
LINE 274        NMAXD = NMAX                                                        00102740
LINE 275        NWBLOK=0                                                            00102750
LINE 276        ISUM=NNCH(1)                                                        00102760
LINE 277        DO 1020       IB=2,NSPT                                             00102770
LINE 278        ISUML= ISUM                                                         00102780
LINE 279        IDIFF = NNCH (IB)- NNCH(IB-1)                                       00102790
LINE 280        ISUM =  ISUM & IDIFF                                                00102800
LINE 281        IF(ISUM .LE. NMAXD)     GO TO 1020                                  00102810
LINE 282        NWBLOK = NWBLOK &1                                                  00102820
LINE 283        NWROW (NWBLOK) = ISUML                                              00102830
LINE 284        ISUM =  IDIFF                                                       00102840
LINE 285     1020 CONTINUE                                                          00102850
LINE 286        NWBLOK =  NWBLOK &1                                                 00102860
LINE 287        NWROW(NWBLOK) =  ISUM                                               00102870
LINE 288        CALL PTGRID(I6,TITLE,MACH,NWING, NSECT, NSP, NNCH, XYZ, ZSECT,      00102880
LINE 289       1            REFLEN, BEETA, XCEN )                                  00102890
LINE 290    C                                                                       00102900
LINE 291    C         CALL SONS TO DETERMINE ISONS(K1,K2)=1 IF SECTION K2 HAS      00102910
LINE 292    C         INFLUENCE ON SECTION K1, OTERWISE ISONS(K1,K2)=0             00102920
LINE 293        CALL SONS( NWING, NSECT, CORNX, CORNY, CORNZ, ISONS )               00102930
LINE 294    C                                                                       00102940
LINE 295        CALL       SONSPT( ISONS, NWING, NSECT, MACH, I6 )                  00102950
LINE 296     25 CONTINUE                                                          00102960
LINE 297    C   ------------------------------------------------------------------00102970
LINE 298    C                                                                       00102980
LINE 299    C                                                                       00102990
LINE 300    C   ------------------------------------------------------------------00103000
LINE 301    C                                                                       00103010
LINE 302    C                                                                       00103020
LINE 303        CALL GETTIM ( ITIME )                                               00103030
LINE 304    C                                                                       00103040
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LINE 305        WRITE(J9, 4001 )                                                00103050
LINE 306   4001 FORMAT(1H1,5X,7HSECTION,30X,16HCPU SECONDS USED,5X,9HTOTAL CPU,//)00103060
LINE 307  C                                                                     00103070
LINE 308        CALL TIMOUT(MSEC,4HREAD,4H INP,4HUT A,4HND G,4HENER,4HATE ,4HGRID,00103080
LINE 309       1  4H    )                                                       00103090
LINE 310  C     ----------------------------------------------------------------00103100
LINE 311        CALL FGEN                                                       00103110
LINE 312        LRECL = NET*NFREQ                                               00103120
LINE 313  C                                                                     00103130
LINE 314  C                                                                     00103140
LINE 315  C                                                                     00103150
LINE 316  C          IF THERE IS ONLY ONE FREQUENCY, AND IT = 0.0, SET IWTE= 0   00103160
LINE 317        LRWTE = 1                                                       00103170
LINE 318        IF( NFREQ .EQ. 1  .AND.  FREQ(1) .EQ. 0.0 ) IWTE = 0            00103180
LINE 319        IF( IWTE .NE. 0 ) LRWTE = NSPT*NFREQ                            00103190
LINE 320        ITWM = IWTE                                                     00103200
LINE 321        IF( IWTE.EQ. 1) ITWM = 1                                        00103210
LINE 322        IF( ERROR ) GO TO 60                                            00103220
LINE 323        IF( ITRUN .NE. 1 ) GO TO 60                                     00103230
LINE 324  C     WRITE( 6,3002) IWTE, ITWM                                       00103240
LINE 325  C                                                                     00103250
LINE 326        CALL      LOOPW ( NET,        NWING, XYZ, NSP, SYM, TRS, NNCH, NE,00103260
LINE 327       1   NSECT, ZSECT, ISONS, I6, TAPE8, XCEN, AREA, WROW, LRECL,     00103270
LINE 328       2 WTEROW,LRWTE,PERC,ERROR, IWTE, REFLEN)                         00103280
LINE 329  C                                                                     00103290
LINE 330        CALL GETTIM ( ITIME )                                           00103300
LINE 331        CALL TIMOUT(MSEC,4HFIND,4H INF,4HLUEN,4HCE C,4HOEFF,4HICIE,4HNT M,00103310
LINE 332       1  4HATR.)                                                       00103320
LINE 333  C                                                                     00103330
LINE 334  C     IF( TEXCD ) WRITE( I6, 1021 ) NTMAX, NCVEL, RKEX,  FRTEST       00103340
LINE 335  C     WRITE( I6, 1022 ) NTMAX, RKEX                                   00103350
LINE 336        GO TO 110                                                       00103360
LINE 337  C                                                                     00103370
LINE 338    60  CONTINUE                                                        00103380
LINE 339        IF( ITRUN .NE. 3 ) GO TO 110                                    00103390
LINE 340  C          CALL SUBROUTINE TO READ RESTART TAPE                       00103400
LINE 341        CALL RSTART( MACH, NET, NFREQ, FREQ, REFLEN, IWTE,TAPE8,I15, I6,00103410
LINE 342       1      FREQR, XYZ, AREA )                                       00103420
LINE 343  C                                                                     00103430
LINE 344.   110  CONTINUE                                                       00103440
LINE 345  C     ----------------------------------------------------------------00103450
LINE 346  C                                                                     00103460
LINE 347  C          READ MODE INPUT                                            00103470
LINE 348  C              MODE CARD HAS BEEN READ                                00103480
LINE 349  C        CALL ROUTINE TO READ MODES IN UNNORMALIZED STRUCTURAL REF. SYST.00103490
LINE 350  C                                                                     00103500
LINE 351  C                                                                     00103510
LINE 352        WRITE(I6,2006)  TITLE                                           00103520
LINE 353        IF( LAB .NE. LMODE ). GO TO 132                                 00103530
LINE 354  C                                                                     00103540
LINE 355        CALL RDMODE( JMODE, NWING, NSECT, NE, XCEN, XYZ, BEETA, REFLEN, 00103550
LINE 356       1  NET, LAB, ID, ERROR,WETA,WDETA,I5,I6,XYZFDZ(1,1),XYZFDZ(1,2), 00103560
LINE 357       2  XYZFDZ(1,3), NMXFDZ,IERR)                                    00103570
LINE 358  C                                                                     00103580
LINE 359        IF(IERR .NE.0)    GO TO 680                                     00103590
LINE 360        IF(NMODES .LT. JMODE)  GO TO 630                                00103600
LINE 361        IF( JMODE .EQ. 0 ) GO TO 500                                    00103610
LINE 362        IF( IFLUSH .EQ. 1 ) GO TO 500                                   00103620
LINE 363  C                                                                     00103630
LINE 364        CALL GETTIM ( ITIME )                                           00103640
LINE 365        CALL TIMOUT(MSEC,4HREAD,4H AND,4H PRO,4HCESS,4H MOD,4HE IN,4HPUT ,00103650
LINE 366       1  4H    )                                                       00103660
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LINE 367  C                                                                    00103670
LINE 368  C                                                                    00103680
LINE 369        IF( LTRUN .EQ. 3 ) GO TO 132                                   00103690
LINE 370        IF( LTRUN .EQ. 1 ) GO TO 132                                   00103700
LINE 371        WRITE( I6, 3031 )                                              00103710
LINE 372        IF( PLOTR ) WRITE( I6,3034 )                                   00103720
LINE 373        GO TO  4                                                       00103730
LINE 374   132  CONTINUE                                                       00103740
LINE 375        IF( .NOT. ERROR ) GO TO 135                                    00103750
LINE 376        WRITE( I6, 3033 )                                              00103760
LINE 377        GO TO  4                                                       00103770
LINE 378   135  CONTINUE                                                       00103780
LINE 379        CALL WRETA (NET,JMODE,WDETA, WETA, I13)                        00103790
LINE 380        CALL WRETA (NET,JMODE,WDETA, WETA, I14)                        00103800
LINE 381  C                                                                    00103810
LINE 382  C                                                                    00103820
LINE 383  C                                                                    00103830
LINE 384  C                                                                    00103840
LINE 385  C     ---------------------------------------------------------------00103850
LINE 386  C                                                                    00103860
LINE 387  C           LOOP ON FREQUENCIES                                      00103870
LINE 388  C                                                                    00103880
LINE 389        DO 300 IF=1,NFREQ                                              00103890
LINE 390  C                                                                    00103900
LINE 391  C           SET LINE .EQ. LMAX & 1 TO FORCE NEW PAGE WITH FREQ. HEADING 00103910
LINE 392        LINE = LMAX & 1                                                00103920
LINE 393  C                                                                    00103930
LINE 394  C                                                                    00103940
LINE 395        FRQ = FREQ(IF)                                                 00103950
LINE 396        CFREQ = CMPLX(0.0,-FRQ/BETA)                                   00103960
LINE 397        XKM = FREQP(IF)*MACH                                           00103970
LINE 398        CXKM = CMPLX( 0.0, XKM )                                       00103980
LINE 399        MC =MMAX                                                       00103990
LINE 400        CALL DIAG( WROW, IF, LRECL,NNCH,MC,D,NET,AROW,IZ,IP,NSPT ,FRQ, 00104000
LINE 401       1 CAROW, CWROW )                                                00104010
LINE 402        CALL GETTIM( ITIME )                                           00104020
LINE 403        WRITE(J9,3025)                                                 00104030
LINE 404        CALL TIMOUT(MSEC,4HREAD,4H AND,4H DEC,4HOMPO,4HSE C,4HOEFF,4H. MA,00104040
LINE 405       1  4HTRIX )                                                     00104050
LINE 406  C                                                                    00104060
LINE 407  C           FIND POSITIVE EXPONENTIAL                                00104070
LINE 408        DO 168 I=1,NET                                                 00104080
LINE 409        FBZ = XCEN(I)*XKM                                              00104090
LINE 410        CXP(I) = CMPLX( COS(FBZ), SIN(FBZ) )                           00104100
LINE 411   168  CONTINUE                                                       00104110
LINE 412  C                                                                    00104120
LINE 413  C           ZERO OUT GENERALIZED COEFFICIENTS  (Q).                  00104130
LINE 414        DO 165 I=1,JMODE                                               00104140
LINE 415        DO 165 J=1,JMODE                                               00104150
LINE 416   165  Q(I,J) = (0.0, 0.0)                                            00104160
LINE 417        REWIND  I13                                                    00104170
LINE 418  C                                                                    00104180
LINE 419  C           LOOP ON PRESSURE MODES                                   00104190
LINE 420  C                                                                    00104200
LINE 421        DO 280 JM = 1,JMODE                                            00104210
LINE 422  C                                                                    00104220
LINE 423  C        SET LINE=LMAX TO FORCE NEW PAGE FOR JM .GT. 1                00104230
LINE 424        IF( JM .GT. 1  .AND. LINE .NE. (LMAX&1) )  LINE=LMAX           00104240
LINE 425        ITW=0                                                          00104250
LINE 426        IF(FRQ .EQ. 0.0)  JCNVGW = NET                                 00104260
LINE 427        CALL RDETA ( I13,DETADX,ETA,NET)                               00104270
LINE 428        DO 167    I=1,NET                                              00104280
```

```
LINE 429  C           CALCULATE  DEDT FOR ONE FREQUENCY AND ONE MODE                    00104290
LINE 430        DEDT(I)=CMPLX (DETADX(I), FRQ* ETA(I)) * CXP(I)                        00104300
LINE 431  C     DEDT(I) = CMPLX( DETADX(I,JM), FRQ*ETA(I,JM) )*CXP(I)                  00104310
LINE 432        PHIW( I ) =0.0                                                         00104320
LINE 433     167 CONTINUE                                                              00104330
LINE 434     169  CONTINUE                                                            00104340
LINE 435        ICNVGW=0                                                               00104350
LINE 436        JCNVGW = 0                                                             00104360
LINE 437  C     WRITE( I6, 2010 ) NDEDT                                                00104370
LINE 438  C     WRITE( I6, 3008 )  IF, FREQ(IF), JM                                    00104380
LINE 439  C                                                                            00104390
LINE 440  C                                                                            00104400
LINE 441        DO 170 I = 1, NET                                                      00104410
LINE 442  C     WRITE( I6, 2009 ) DEDT(I)                                              00104420
LINE 443        DR(I)     = DEDT(I)                                                    00104430
LINE 444        DI   (I) = AIMAG( DEDT(I))                                             00104440
LINE 445     170 CONTINUE                                                              00104450
LINE 446  C     WRITE( I6, 2010 ) NDPDX                                                00104460
LINE 447  C     WRITE( I6, 2009 )   DPDX(I)                                            00104470
LINE 448        DO 172             I = 1,NET                                           00104480
LINE 449        CABSI = SQRT( DR(I) **2  &  DI(I) ** 2)                                00104490
LINE 450        IF (CABSI.NE. 0.0)   GO TO 178                                         00104500
LINE 451     172 CONTINUE                                                              00104510
LINE 452        DO 174        I=1,NET                                                  00104520
LINE 453     174 DPDX(I) =0.0                                                          00104530
LINE 454        GO TO         181                                                      00104540
LINE 455     178 CONTINUE                                                              00104550
LINE 456        WRITE(I6, 3027)                                                        00104560
LINE 457    3027 FORMAT(1H1,18X,  38HSOLUTION FOR DOWNWASH USING ITERATION )          00104570
LINE 458        IF( WAKENZ )     IGWESS=0                                              00104580
LINE 459        IF( .NOT. WAKENZ)  IGWESS=0                                            00104590
LINE 460        IF( LWTE .EQ.0)     IGWESS=0                                           00104600
LINE 461        IF (LTW  .EQ. 0)  IGWESS=0                                             00104610
LINE 462        CALL ITRATE( LL1,DR,DI, DPDX, GT  ,MC,D, IP,DNWR,DNWI,RWR,RWI,         00104620
LINE 463       1 NET,AROW,IZ ,DPDX,WW)                                                 00104630
LINE 464     181 CONTINUE                                                              00104640
LINE 465        CALL GETTIM(LTIME)                                                     00104650
LINE 466        CALL TIMOUT(MSEC,4HSOLV,4HE FO,4HR PC,4HTENT,4HIAL ,4HGRAD,4HIENT,     00104660
LINE 467       1  4H     )                                                           00104670
LINE 468        DO  180 I=1,NET                                                        00104680
LINE 469        DPDX(I) = DPDX(I)/CXP(I)                                               00104690
LINE 470     180  CONTINUE                                                           00104700
LINE 471  C                                                                         00104710
LINE 472  C           LOOP ON WINGS AND SPANS                                       00104720
LINE 473  C                                                                         00104730
LINE 474  C           NSPI IS SPAN COUNTER                                          00104740
LINE 475        NSPI = 0                                                            00104750
LINE 476        INDXR = 1                                                           00104760
LINE 477        DO 240 J=1,NWING                                                    00104770
LINE 478  C                                                                         00104780
LINE 479        TL(J,JM) = ( 0.0, 0.0 )                                             00104790
LINE 480        TM(J,JM) = ( 0.0, 0.0 )                                             00104800
LINE 481        INDXL = INDXR                                                       00104810
LINE 482        NSPW = NSPNG(J)                                                     00104820
LINE 483  C     WRITE( I6, 3007 )                                                   00104830
LINE 484  C                                                                         00104840
LINE 485  C           LOOP ON SPANS IN WING                                         00104850
LINE 486        DO 220 ISP=1,NSPW                                                   00104860
LINE 487  C                                                                         00104870
LINE 488        NSPI = NSPI  & 1                                                    00104880
LINE 489        NEPS = NNCH(NSPI) - INDXR & 1                                       00104890
LINE 490        IF(NEPSPN .LT. NEPS )  GO TO 670                                    00104900
```

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LINE 491        CALL PHIL( XLE(NSPI),XCEN(INDXR),DPDX(INDXR),NEPS,PHI,CXKM,          00104910
LINE 492       1   CXP(INDXR), PHIW(INDXR))                                         00104920
LINE 493        IF(FR).EQ.0.0)  GO TO 182                                           00104930
LINE 494         IF(LWTE.EQ.0)  GO TO 182                                           00104940
LINE 495        IF(.NOT. WAKE  )  GO TO 182                                         00104950
LINE 496        IF(.NOT. WAKENZ)  GO TO 182                                         00104960
LINE 497   182  CONTINUE                                                           00104970
LINE 498   C    WRITE( I6, 3002 ) J, ISP                                           00104980
LINE 499        DLS = (0.0, 0.0)                                                   00104990
LINE 500        PMS = (0.0, 0.0)                                                   00105000
LINE 501   C                                                                      00105010
LINE 502   C         LOOP ON NUMBER OF ELEMENTS IN SPAN ISP                       00105020
LINE 503        DO 210 IE=1,NEPS                                                   00105030
LINE 504        PRES(INDXR) =  (DPDX(INDXR) & CFREQ*PHI(IE) )*TWOPI                00105040
LINE 505        DLOAD = PRES(INDXR)*AREA(INDXR)                                    00105050
LINE 506   C    WRITE( I6, 3003 ) INDXR, PHI(IE), PRES(INDXR), DLOAD               00105060
LINE 507        DLS = DLS & DLOAD                                                  00105070
LINE 508        PMS = PMS & ( XP - XCEN(INDXR). )*DLOAD                            00105080
LINE 509        INDXR = INDXR & 1                                                  00105090
LINE 510   C            END LOOP ON ELEMENT IE OF SPAN ISP                        00105100
LINE 511    210 CONTINUE                                                          00105110
LINE 512   C                                                                      00105120
LINE 513        DLSPAN(NSPI) = DLS/SW(NSPI).                                       00105130
LINE 514        PMPSPN(NSPI) = PMS/SW(NSPI)                                        00105140
LINE 515   C    WRITE( I6, 3004 ) DLSPAN(NSPI), PMPSPN(NSPI)                       00105150
LINE 516        TL(J,JM) = TL(J,JM) & DLS                                          00105160
LINE 517        TM(J,JM) = TM(J,JM) & PMS                                          00105170
LINE 518   C                                                                      00105180
LINE 519   C            END LOOP ON SPAN ISP OF WING J                            00105190
LINE 520    220 CONTINUE                                                          00105200
LINE 521   C    WRITE( I6, 3005 ) TL(J,JM), TM(J,JM)                               00105210
LINE 522   C                                                                      00105220
LINE 523        IF( IPW(J) .EQ. 0 ) GO TO 240                                      00105230
LINE 524        IF (LWTE.EQ. 0)  GO TO   230                                       00105240
LINE 525        IF( .NOT. WAKE)  GO TO   230                                       00105250
LINE 526        IF( .NOT. WAKENZ) GO TO  230                                       00105260
LINE 527        WRITE (I6, 3040)  ITW                                              00105270
LINE 528    230 CONTINUE                                                          00105280
LINE 529        CALL JUTP1( MACH, FRQ,JM,J,NSECT(J), NSP(1,J), SW,         DLSPAN, 00105290
LINE 530       1     PMPSPN, XPIN,INDXI, PRES, IPW, I3, LINE, LMAX, NNCH, NE(1,J), 00105300
LINE 531       1     TITLE , PHIW, NSPT )                                         00105310
LINE 532   C                                                                      00105320
LINE 533   C            END LOOP ON WINGS J                                       00105330
LINE 534    240 CONTINUE                                                          00105340
LINE 535         IF(LWTE.EQ.0) GO TO 245                                           00105350
LINE 536        IF((ITWM .EQ. ITW) .OR. (JCNVGW. EQ.NET)) GO TO 245                00105360
LINE 537        IF(.NOT. WAKE  ) GO TO 245                                         00105370
LINE 538        IF(.NOT. WAKENZ) GO TO 245                                         00105380
LINE 539        REWIND I12                                                         00105390
LINE 540        ITW =  ITW&1                                                       00105400
LINE 541        CALL WTEPHT( DEDT, NET, PHIW,IZ, I12, WTE)                         00105410
LINE 542        GO TO 169                                                          00105420
LINE 543   C                                                                      00105430
LINE 544    245 CONTINUE                                                          00105440
LINE 545   C                                                                      00105450
LINE 546   C         LOOP ON DISPLACEMENT MODE TO CALCULATE Q                      00105460
LINE 547   C                                                                      00105470
LINE 548        REWIND I14                                                         00105480
LINE 549        DO  270  IM=1,JMODE                                                00105490
LINE 550   C         READ ETA FROM I14                                            00105500
LINE 551        CALL RDETA ( I14,DETADX,ETA,NET)                                   00105510
LINE 552   C         LOOP OVER ALL ELEMENTS BY WINGS                              00105520
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LINE 553          INDXR = 0                                                                    00105530
LINE 554          DO  260 J=1,NWING                                                            00105540
LINE 555          SYMCON = 2.0                                                                 00105550
LINE 556  C             SYMMETRY CODE  SYMCON  DEFINED HERE                                    00105560
LINE 557          IF( SYM(J) .EQ. 0.0 )  SYMCON = 1.0                                          00105570
LINE 558          NS = NSECT(J)                                                                00105580
LINE 559          NEW = 0                                                                      00105590
LINE 560          DO  265 I=1,NS                                                               00105600
LINE 561   265    NEW = NEW + NE(I,J)                                                          00105610
LINE 562          DO  250 IE = 1,NEW                                                           00105620
LINE 563          INDXR = INDXR + 1                                                            00105630
LINE 564          DLOAD = PRES(INDXR)*AREA(INDXR) SYMCON                                       00105640
LINE 565          Q(IM,JM) = Q(IM,JM) + ETA(INDXR)*DLOAD                                       00105650
LINE 566   250    CONTINUE                                                                     00105660
LINE 567   260    CONTINUE                                                                     00105670
LINE 568   270    CONTINUE                                                                     00105680
LINE 569  C                                                                                    00105690
LINE 570  C               END LOOP ON MODE JM                                                  00105700
LINE 571   280    CONTINUE                                                                     00105710
LINE 572  C                                                                                    00105720
LINE 573  C       WRITE( I6, 2010 )  NOIJ                                                      00105730
LINE 574  C       DO 320 I=1,JMODE                                                             00105740
LINE 575  C320    WRITE( I6, 3006 ) I, ( Q(I,J), J=1,JMODE )                                   00105750
LINE 576  C               END LOOP ON FREQUENCY IF                                             00105760
LINE 577          LINE = LMAX                                                                  00105770
LINE 578          CALL OUTP3( I3, MACH, FRQ, JMODE, Q, LINE, LMAX, TITLE )                     00105780
LINE 579          CALL OUTP2( I3, NWING,XPIN,TL, TM, JMODE, FRQ, MACH, LINE, LMAX )            00105790
LINE 580          CALL GETTIM ( ITIME )                                                        00105800
LINE 581          CALL TIMOUT(MSEC,4HSOLV,4HE FO,4HR DO,4HNNWA,4HSH F,4HOR O,4HNE F,           00105810
LINE 582         1  4HREQ.)                                                                   00105820
LINE 583   300    CONTINUE                                                                     00105830
LINE 584   500    CONTINUE                                                                     00105840
LINE 585          WRITE(I6, 3026 )                                                             00105850
LINE 586          IF(ITRUN .EQ. 3) GO TO 10                                                    00105860
LINE 587          WRITE (I6, 3030).                                                            00105870
LINE 588  C                                                                                    00105880
LINE 589  C                                                                                    00105890
LINE 590  C                                                                                    00105900
LINE 591          GO TO 4                                                                      00105910
LINE 592   610    IERR = 610                                                                   00105920
LINE 593          CALL MXERR (IERR, NWINGS ,NWING  , I6 )                                      00105930
LINE 594          GO TO 500                                                                    00105940
LINE 595   620    IERR = 620                                                                   00105950
LINE 596          CALL MXERR (IERR, NSECTN , NS    , I6 )                                      00105960
LINE 597          GO TO 500                                                                    00105970
LINE 598   630    IERR = 630                                                                   00105980
LINE 599          CALL MXERR (IERR, NMODES ,JMODE  , I6 ).                                     00105990
LINE 600          GO TO 500                                                                    00106000
LINE 601   640    IERR = 640                                                                   00106010
LINE 602          CALL MXERR (IERR, NSPANS ,NSPT   , I6 )                                      00106020
LINE 603          GO TO 500                                                                    00106030
LINE 604   650    IERR = 650                                                                   00106040
LINE 605          CALL MXERR (IERR, NCORNR , JCN   , I6 )                                      00106050
LINE 606          GO TO 500                                                                    00106060
LINE 607   660    IERR = 660                                                                   00106070
LINE 608          CALL MXERR (IERR, NFRQUN ,NFREQ  , I6 )                                      00106080
LINE 609          GO TO 500                                                                    00106090
LINE 610   670    IERR = 670                                                                   00106100
LINE 611          CALL MXERR (IERR, NEPSPN ,NEPS   , I6 )                                      00106110
LINE 612          GO TO 500                                                                    00106120
LINE 613   680    IERR=680                                                                     00106130
LINE 614          CALL MXERR(IERR, NFXMDZ,N, I6)                                               00106140
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LINE 615         GO TO 500                                                      00106150
LINE 616   CDC   REPLACES                                                      00106160
LINE 617   C   10 CONTINUE                                                     00106170
LINE 618     10  IF( PLOTR1) CALL PLOTS( IBUFF, 8000 )                        00106180
LINE 619         IF(PLOTR1)  CALL EFPLOT(4HEND )                             00106190
LINE 620         WRITE(16,3028)                                              00106200
LINE 621    3028 FORMAT(1H0//// 5X, 10(1H*),5X,1 ..0 OF JOB  , 5X,10(1H*))   00106210
LINE 622         STOP                                                        00106220
LINE 623   C                                                                  00106230
LINE 624    1006 FORMAT(A4,2X, 14A4, 10A1)                                     00106240
LINE 625    2006 FORMAT  (1H1, /20X,14A4, 10A1//)                              00106250
LINE 626    3025 FORMAT(1H0)                                                   00106260
LINE 627    3026 FORMAT(1H1)                                                   00106270
LINE 628    3030 FORMAT(////  5X, 10(1H*), 5X, 20HEND OF EXECUTION RUN,5X,10(1H*)  00106280
LINE 629        1  //  5X, 10(1H*),5X,  35HPROGRAM WILL NOW CYCLE TO NEXT CASE,5X,  00106290
LINE 630        2  10(1H*))                                                    00106300
LINE 631    3040 FORMAT(1H1,  8X,   33HWAKE EFFECTS VELOCITY POTENTIALS   / 8X  00106310
LINE 632        1 17HITERATION NUMBER  , I12 )                                 00106320
LINE 633   C3004 FORMAT( / 9H LIFT/DS=, 1P2E12.4, 5X,11H MOMENT/DS=,1P2E12.4 / )  00106330
LINE 634   C3002 FORMAT( 215 )                                                 00106340
LINE 635   C3003 FORMAT( 11X, I3, 3( 6X, 1P2E12.4 ) )                         00106350
LINE 636   C3005 FORMAT( /// 5X, 4HTL = , 1P2E12.5, 5X, 4HTM =, 1P2E12.5 / )  00106360
LINE 637   C3007 FORMAT(// 10H WING SPAN/11X,3HELE,13X,3HPHI,27X,4HPRES,26X,4HLOAD)  00106370
LINE 638    3031 FORMAT( ////  5X, 10(1H*), 5X,16HEND OF CHECK RUN, 5X, 10(1H*) // 00106380
LINE 639        1  5X, 10(1H*), 5X, 70HTO EXECUTE A COMPLETE RUN PUT A '1' IN COLUM  00106390
LINE 640        2N 8 OF THE 'RUN' DATA CARD, 5X,  10(1H*)  )                   00106400
LINE 641    3032 FORMAT( / 5X, 10(1H*), 5X, 78HIF ANOTHER PLOT IS NOT DESIRED, PUT 00106410
LINE 642        1 A '0' IN COLUMN 10 OF THE 'RUN' DATA CARD, 5X, 10(1H*)  )    00106420
LINE 643    3033 FORMAT(/// 1X, 120(1H*) // 5X, 10(1H*),5X, 40HRUN TERMINATED DUE TO  00106430
LINE 644        1D ERRORS GIVEN ABOVE,  5X, 55(1H*) // 1X, 120(1H*) )          00106440
LINE 645   C1000 FORMAT( A4, 2X, 9I2, 4E12.0 )                                 00106450
LINE 646   C1001 FORMAT( 24X, 4E12.0 )                                         00106460
LINE 647   C1003 FORMAT( 1X, 'COL=', I3, 5X,  1P5E16.5 / ( 13X, 1P5E16.5  )  )  00106470
LINE 648   C1008 FORMAT( 3E10.0 )                                              00106480
LINE 649   C1009 FORMAT( I5 /(5E10.0) )                                        00106490
LINE 650   C1011 FORMAT( 15X, A4 )                                             00106500
LINE 651   C1021 FORMAT( /// 1X, 120(1H*) / 5X, 9HMORE THAN, I3, 37H TERMS ARE NEED  00106510
LINE 652   C     1ED FOR CONVERGENCE FOR,  I5, 19H PAIRS OF ELEMENTS. // 5X,    00106520
LINE 653   C     2 27H THE MAXIMUM RADIUS*KAPPA =, E15.4, 14H, WITH KAPPA =,E15.6//)  00106530
LINE 654   C1022 FORMAT( // 5X, 55H THE GREATEST NUMBER OF TERMS NEEDED FOR CONVERG  00106540
LINE 655   C     1ENCE IS, I3 //5X,26HTHE MAXIMUM RADIUS*KAPPA =, E15.4 // )    00106550
LINE 656   C2007 FORMAT( 20X,  11HMACH NUMBER, F22.4 //)                        00106560
LINE 657   C2008 FORMAT(                                  // 20X, 21HNUMBER OF FREQUENCI  00106570
LINE 658   C     1ES, I12  / 20X, 19HLIST OF FREQUENCIES, 5F14.4 / (39X, 5F14.4) )  00106580
LINE 659   C2009 FORMAT( 2E18.6 )                                              00106590
LINE 660   C2010 FORMAT( /// 5X,  2A4 )                                        00106600
LINE 661   C3001 FORMAT(/// 18H RECEIVING ELEMENT, I5, 5X, 6HNUMBER, I4, 5X,   00106610
LINE 662   C     1 10HOF SECTION, I2, 5X, 7HOF WING,I2 // (1X, 10E13.4 )  )    00106620
LINE 663   C3006 FORMAT( 1X, 4HROW=, I3,      4(6X, 1P2E12.4)/(8X,4(6X,1P2E12.4)) )  00106630
LINE 664   C3008 FORMAT( // 1X, 8HFREQ. NO, I3, 8X, 5HFREQ =,F8.4, 5X, 4HMODE,I3//)  00106640
LINE 665   C3034 FORMAT( /// 21X, 19HMODAL DATA FOR WING, I2,  8H SECTION, I2 )  00106650
LINE 666         END                                                           00106660
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DISPLAY...FILE DECK 02

```
LINE    1          BLOCK DATA                                                                    00200010
LINE    2          INTEGER PRINT                                                                 00200020
LINE    3          COMMON/CEPS/  EPS                                                             00200030
LINE    4          COMMON / ITERAT / ITMAX                                                       00200040
LINE    5          COMMON /MAXE/ NMXE                                                            00200050
LINE    6          COMMON/MXSTOR/ NWINGS,NSECTN,NMODES,NSPANS,NCORNR,NFRQUN,NEPSPN               00200060
LINE    7         1 , NMXFDZ                                                                     00200070
LINE    8          COMMON  / PEREPS /  PERC                                                      00200080
LINE    9          COMMON  /TAPE/ I9,I10,I11,I12,I13,I14,J9,I15                                  00200090
LINE   10          COMMON /VELCOM /  NMAX,PRINT, NWBLOK, NWROW(20)                               00200100
LINE   11  C       NWINGS= 4                                                                     00200110
LINE   12  C       NSECTN= 3                                                                     00200120
LINE   13  C       NMODES= 10                                                                    00200130
LINE   14  C       NSPANS=  100                                                                  00200140
LINE   15  C       NCORNR= 8                                                                     00200150
LINE   16  C       NFRQUN= 12                                                                    00200160
LINE   17  C       NEPSPN= 70                                                                    00200170
LINE   18          DATA   EPS /.01/                                                              00200180
LINE   19          DATA ITMAX /10/                                                               00200190
LINE   20          DATA I9,I10,I11 /8,10,11/                                                     00200200
LINE   21          DATA   I12/12/                                                                00200210
LINE   22          DATA   I13/13/                                                                00200220
LINE   23          DATA   I14/14/                                                                00200230
LINE   24          DATA   I15/15/                                                                00200240
LINE   25          DATA  J9/9/                                                                   00200250
LINE   26          DATA NMAX/60/                                                                 00200260
LINE   27          DATA           NWINGS,NSECTN,NMODES,NSPANS,NCORNR,NFRQUN,NEPSPN               00200270
LINE   28         1 , NMXFDZ                                                                     00200280
LINE   29         2   / 4, 3, 10, 100, 8, 12, 70, 300 /                                         00200290
LINE   30          DATA   PERC  /  0.005  /                                                      00200300
LINE   31          DATA PRINT /2/                                                                00200310
LINE   32          END                                                                           00200320
```

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DISPLAY...FILE          DECK 03

LINE    1       FUNCTION CABSO( A)                                      00300010
LINE    2       COMPLEX  A                                              00300020
LINE    3       AR = A                                                  00300030
LINE    4       AI = AIMAG(A)                                           00300040
LINE    5       CABSO =  AR**2 & AI**2                                  00300050
LINE    6       CABSO =  SQRT (CABSO)                                   00300060
LINE    7       RETURN                                                  00300070
LINE    8       END                                                     00300080
```

DISPLAY...FILE DECK 04

```
LINE    1       SUBROUTINE DECOM  (N,NDIM,A,IP)                                  00400010
LINE    2  C                                                                      00400020
LINE    3  C    SUBROUTINE DECOM                                                  00400030
LINE    4  C                                                                      00400040
LINE    5  C    PURPOSE                                                           00400050
LINE    6  C       FACTORIZATION OF THE MATRIX A INTO A PRODUCT OF A LOWER         00400060
LINE    7  C       TRIANGULAR MATRIX L AND AN UPPER TRIANGULAR MATRIX U.  L HAS   00400070
LINE    8  C       A UNIT DIAGONAL WHICH IS NOT STORED.                           00400080
LINE    9  C                                                                      00400090
LINE   10  C    USAGE                                                             00400100
LINE   11  C       CALL DECOM(N,NDIM,A,IP)                                        00400110
LINE   12  C                                                                      00400120
LINE   13  C    DESCRIPTION OF PARAMETERS                                         00400130
LINE   14  C       N   - ORDER OF THE MATRIX A                                    00400140
LINE   15  C       NDIM- FIRST DIMENSION OF A DECLARED IN CALLING PROGRAM. IF A IS00400150
LINE   16  C             SINGLY SUBSCRIPTED IN CALLING PROGRAM, SET NDIM=N.      00400160
LINE   17  C       A   - ON INPUT THE MATRIX TO BE FACTORED.                      00400170
LINE   18  C             ON OUTPUT A(I,J) I.LE.J CONTAINS THE UPPER TRIANGLE U,  00400180
LINE   19  C                      A(I,J) I.GT.J CONTAINS (I-L), WHERE I IS THE  00400190
LINE   20  C                      IDENTITY MATRIX AND L IS THE LOWER TRIANGLE.  00400200
LINE   21  C       IP  - IP(K) K.LT.N CONTAINS THE ROW INTERCHANGE INFORMATION.   00400210
LINE   22  C             IP(N) CONTAINS (-1)**(NUMBER OF INTERCHANGES) OR 0.     00400220
LINE   23  C                                                                      00400230
LINE   24  C    REMARKS                                                           00400240
LINE   25  C       (1) IF IP(N)=0 THEN MATRIX A IS SINGULAR.                      00400250
LINE   26  C       (2) USE DECOM IN CONJUNCTION WITH SUBROUTINE 'SOLVE' TO OBTAIN 00400260
LINE   27  C           THE SOLUTION OF THE LINEAR SYSTEM A*X = B.                  00400270
LINE   28  C       (3) DETERMINANT(A) = IP(N)*A(1,1)*A(2,2),*....*A(N,N).         00400280
LINE   29  C       (4) THE ROW INTERCHANGE INFORMATION STORED IN IP IS NOT EASY TO00400290
LINE   30  C           INTERPRET. HOWEVER, IT IS USED PROPERLY BY 'SOLVE'.        00400300
LINE   31  C                                                                      00400310
LINE   32  C    SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED.                    00400320
LINE   33  C       NONE                                                           00400330
LINE   34  C                                                                      00400340
LINE   35  C    METHOD                                                            00400350
LINE   36  C       MATRIX TRIANGULARIZATION BY GAUSSIAN ELIMINATION.  SEE         00400360
LINE   37  C       ALGORITHM 423, 'COLLECTED ALGORITHMS FROM CACM', BY CLEVE MOLER00400370
LINE   38  C                                                                      00400380
LINE   39       DIMENSION A(NDIM,1),IP(1)                                         00400390
LINE   40       IP(N) = 1                                                         00400400
LINE   41       DO 6 K = 1,N                                                      00400410
LINE   42       IF (K .EQ. N) GO TO 5                                             00400420
LINE   43       KP1 = K&1                                                         00400430
LINE   44       M = K                                                             00400440
LINE   45       DO 1 I = KP1,N                                                    00400450
LINE   46       IF (ABS(A(I,K)) .GT. ABS(A(M,K))) M=I                             00400460
LINE   47     1 CONTINUE                                                          00400470
LINE   48       IP(K) = M                                                         00400480
LINE   49       IF (M .NE. K) IP(N) = -IP(N)                                      00400490
LINE   50       T = A(M,K)                                                        00400500
LINE   51       A(M,K) = A(K,K)                                                   00400510
LINE   52       A(K,K) = T                                                        00400520
LINE   53       IF (T .EQ. 0.) GO TO 5                                            00400530
LINE   54       DO 2 I = KP1,N                                                    00400540
LINE   55     2    A(I,K) = -A(I,K)/T                                           00400550
LINE   56       DO 4 J = KP1,N                                                    00400560
```

```
LINE   57         T = A(M,J)                                          00400570
LINE   58         A(M,J) = A(K,J)                                     00400580
LINE   59         A(K,J) = T                                          00400590
LINE   60         IF (T .EQ. 0.) GO TO 4                              00400600
LINE   61         DO 3 I = KP1,N                                      00400610
LINE   62  C      IF ( A(I,J) .EQ. 0.0) GO TO  21                     00400620
LINE   63  C      C = (A(I,J) & A(I,K) *T)  / A(I,J)                  00400630
LINE   64  C      C = ABS(C)                                          00400640
LINE   65  C      IF( C.LE. .0001)     A(I,J)=0.0                     00400650
LINE   66  C      IF( C.LE. .0001)     GO TO 3                        00400660
LINE   67  C 21   CONTINUE                                            00400670
LINE   68           A(I,J) = A(I,J) & A(I,K)*T                        00400680
LINE   69     3   CONTINUE                                            00400690
LINE   70       4 CONTINUE                                            00400700
LINE   71       5 IF (A(K,K) .EQ. 0.) IP(N) = 0                       00400710
LINE   72       6 CONTINUE                                            00400720
LINE   73         RETURN                                              00400730
LINE   74         END                                                 00400740
```

DISPLAY...FILE DECK 05

```
LINE    1        SUBROUTINE DIAG(WROW,IF,LRECL,NNCH,MC, D, NET,AROW,IZ, IP ,      00500010
LINE    2       1 NSPT,FRQ,CAROW,CWROW)                                           00500020
LINE    3        COMPLEX  CAROW(1), CWROW(1)                                      00500030
LINE    4        COMPLEX WTES                                                     00500040
LINE    5        INTEGER PRINT                                                    00500050
LINE    6        LOGICAL TREDGE                                                   00500060
LINE    7        LOGICAL  WAKE,WAKE1,WAKENZ                                       00500070
LINE    8        DIMENSION  AROW(NET), IZ(NET)                                    00500080
LINE    9        DIMENSION  D(MC,MC), IP(MC)                                      00500090
LINE   10        DIMENSION  NNCH(1)                                               00500100
LINE   11        DIMENSION WROW(LRECL)                                            00500110
LINE   12        COMMON /K1112/ KST11,KST12                                       00500120
LINE   13        COMMON  /TAPE/ I9,I10,I11,I12,I13,I14,J9,I15                     00500130
LINE   14        COMMON /VELCOM/  NMAX,PRINT,NWBLOK,NWROW(20)                     00500140
LINE   15        COMMON /WAKE/ ITWM, ITW, ICNVGW, EPSW, JCNVGW,LRWTE,IWTE         00500150
LINE   16        COMMON/WAKEUP/ WTES(12), TREDGE,WAKE1,WAKE, WAKENZ, KWAKE        00500160
LINE   17        REWIND  I11                                                      00500170
LINE   18        REWIND I9                                                        00500180
LINE   19        REWIND I10                                                       00500190
LINE   20        I8 = I9                                                          00500200
LINE   21        IF (IWTE .EQ.0)   REWIND I12                                     00500210
LINE   22        IF(WAKE)          REWIND I15                                     00500220
LINE   23        READ(I9)                                                         00500230
LINE   24        IF(WAKE) READ(I15)                                               00500240
LINE   25        IBT =0                                                           00500250
LINE   26        K1=0                                                             00500260
LINE   27        K=0                                                              00500270
LINE   28        WAKENZ=.FALSE.                                                   00500280
LINE   29        DO 40          IB=1,NWBLOK                                       00500290
LINE   30        NROW =  NWROW(IB)                                                00500300
LINE   31        DO 20           I = 1,NROW                                       00500310
LINE   32        K=K&1                                                            00500320
LINE   33        CALL FREQW(I9,AROW,WROW,      IF,LRECL)                          00500330
LINE   34        DO 15           J=1,NROW                                         00500340
LINE   35        M= J&IBT                                                         00500350
LINE   36        D(I,J)  = AROW(M)                                                00500360
LINE   37        AROW(M) = 0.0                                                    00500370
LINE   38    15  CONTINUE                                                        00500380
LINE   39        IF(NWBLOK .NE.1)                                                 00500390
LINE   40       1CALL WRITEO(K, AROW, IZ, WROW,NET)                               00500400
LINE   41        IF (IWTE .EQ.0)   GO TO 20                                       00500410
LINE   42        IF( .NOT. WAKE ) GO TO 20                                        00500420
LINE   43        IF( K .GT. KWAKE ) GO TO 20                                      00500430
LINE   44        IF(K1 .GT.K) GO TO 20                                            00500440
LINE   45        IF(FRQ.EQ.0.0)   GO TO 20                                        00500450
LINE   46        CALL WAKET( I12,CAROW,CWROW,IF,LRWTE,NSPT,                       00500460
LINE   47       1 I15,IZ,K1,NNCH,FRQ,K)                                           00500470
LINE   48    20  CONTINUE                                                        00500480
LINE   49        IBT =  IBT & NROW                                                00500490
LINE   50  C     CALL MATPRT( D, NROW, NROW, 'D MATRIX' )                         00500500
LINE   51        CALL DECOM( NROW,NMAX,D,IP)                                      00500510
LINE   52        WRITE   (I10) D, IP                                              00500520
LINE   53    40  CONTINUE                                                        00500530
LINE   54        END FILE I10                                                     00500540
LINE   55        END FILE I11                                                     00500550
LINE   56        REWIND  I10                                                      00500560
```

```
LINE   57        REWIND  I11                                          00500570
LINE   58        IF(IWTE .NE. 0)   END FILE I12                       00500580
LINE   59        IF(IWTE .NE. 0)   REWIND I12                         00500590
LINE   60        RETURN                                               00500600
LINE   61        END                                                  00500610
```

DISPLAY...FILE DECK 06

```
LINE    1        SUBROUTINE ECHO( KONTRL).                                                    00600010
LINE    2        DIMENSION CARD(20)                                                           00600020
LINE    3        COMMON /TAPE/ I9,I10,I11,I12,I13,I14,J9,I15                                  00600030
LINE    4        COMMON / ZFDZIO / J5,J6                                                      00600040
LINE    5        DATA CEND/4HEND /                                                            00600050
LINE    6        KONTRL = 0                                                                   00600060
LINE    7        REWIND I11                                                                   00600070
LINE    8        LINES = 0                                                                    00600080
LINE    9        WRITE(J6,500)                                                                00600090
LINE   10     10 READ(J5,2000 , END = 100) CARD                                               00600100
LINE   11  CDC10 READ (  J5,2000) CARD                                                        00600110
LINE   12  CDC    IF ( EOF(J5)) 100,11                                                        00600120
LINE   13     11 CONTINUE                                                                     00600130
LINE   14        LINES = LINES & 1                                                            00600140
LINE   15        IF( LINES .LT. 47 ) GO TO 50                                                00600150
LINE   16        WRITE(J6,700)                                                                00600160
LINE   17        WRITE(J6,500)                                                                00600170
LINE   18        LINES = 0                                                                    00600180
LINE   19     50 WRITE(I11, 2000) CARD                                                        00600190
LINE   20        WRITE(J6,600) CARD                                                           00600200
LINE   21        IF( CARD(1) .EQ. CEND)  GO TO 90                                            00600210
LINE   22        GO TO 10                                                                     00600220
LINE   23  C          END OF ONE CASE                                                         00600230
LINE   24     90 WRITE(J6,700)                                                                00600240
LINE   25        END FILE I11                                                                 00600250
LINE   26        REWIND I11                                                                   00600260
LINE   27        RETURN                                                                       00600270
LINE   28  C          END OF JOB                                                              00600280
LINE   29    100 KONTRL = 1                                                                  00600290
LINE   30        RETURN                                                                       00600300
LINE   31    500 FORMAT(1H1,41X, 46H* * * * ISCON ANALYSIS INPUT DATA DECK * * * *,00600310
LINE   32       1 //,1H0,24X,1H ,9X,1H1,9X,1H2,9X,1H3,9X,1H4,9X,1H5,9X,1H6,9X,1H7, 00600320
LINE   33       2 9X,1H8 /25X,81H 12345678901234567890123456789012345678901234567890600330
LINE   34       301234567890123456789012345678901234567890 //)                               00600340
LINE   35    600 FORMAT(1H ,25X,20A4).                                                       00600350
LINE   36    700 FORMAT(//25X,81H 12345678901234567890123456789012345678901234567890600360
LINE   37       101234567890123456789012345678901234567890 /25X,1H ,9X,1H1,9X,1H2,9X,1H3,9X,100600370
LINE   38       2H4,9X,1H5,9X,1H6,9X,1H7,9X,1H8)                                             00600380
LINE   39   2000 FORMAT(20A4).                                                              00600390
LINE   40        END                                                                          00600400
```

DISPLAY...FILE DECK 07

```
LINE    1       SUBROUTINE EFPLOT (A)                                   00700010
LINE    2       CALL CALPLT(0.0,0.0,999)                                00700020
LINE    3       RETURN                                                  00700030
LINE    4       END                                                     00700040
```

DISPLAY...FILE DECK 08

```
LINE    1        SUBROUTINE EONE                                                        00800010
LINE    2  C                                                                            00800020
LINE    3        LOGICAL EREONE, EMIRRO                                                 00800030
LINE    4        COMMON / EEW / XUP, YUP, XLW, YLW, EREONE, EMIRRO, RR, RL, RTR,RTL     00800040
LINE    5        COMMON / RRLL / TVW(4), YRO, YLO, ZR, ZRZR, ZL, ZLZL                   00800050
LINE    6        COMMON / WW1 / XO,YO,ZD,ZDZD, SYMK                                     00800060
LINE    7  C                                                                            00800070
LINE    8  C          TEST IF ELEMENT AND MIRROR IMAGE OF ELEMENT ARE IN MACH CONE     00800080
LINE    9  C          EREONE     TRUE IF ELEMENT IS IN MACH CONE                       00800090
LINE   10  C          EMIRRO     TRUE IF SYMMETRY CODE .NE. 0 AND MIRROR IMAGE IS      00800100
LINE   11  C                     IN MACH CONE.  IF ERONE=FALSE THEN EMIRRO=FALSE.      00800110
LINE   12  C          XO,YO      COORDINATES OF RECEIVING PT.(CENTER OF REC. ELE.)     00800120
LINE   13  C          XLW,YLW    1ST PT. ON LINE          OF INFLUENCING ELE.          00800130
LINE   14  C          XUP,YUP    2ND PT. ON LINE          OF INFLUENCING ELE.          00800140
LINE   15  C          SYMK       SYMMETRY CODE ( 0.0 FOR NO SYMMETRY )                 00800150
LINE   16  C        RR      AVERAGE R OF RIGHT-HAND ELEMENT                           00800160
LINE   17  C        RL      AVERAGE R OF LEFT-HAND ELEMENT                            00800170
LINE   18  C                                                                          00800180
LINE   19  C          NOTE THIS ROUTINE IS ALSO USED TO TEST TRAILING EDGE LINE OF    00800190
LINE   20  C          ELEMENT WHEN X1,Y1 AND X2,Y2 ARE ON TRAILING EDGE AND SYM=0.0   00800200
LINE   21  C                                                                          00800210
LINE   22        EREONE = .FALSE.                                                     00800220
LINE   23        EMIRRO = .FALSE.                                                     00800230
LINE   24        RR = 0.0                                                             00800240
LINE   25        RL = 0.0                                                             00800250
LINE   26        ZETA1 = XO - XLW                                                     00800260
LINE   27        ZETA2 = XO - XUP                                                     00800270
LINE   28        IF( ZETA1 .LE. 0.0  .AND.  ZETA2 .LE. 0.0 ) RETURN                  00800280
LINE   29        ETA1 = YRO - YLW                                                     00800290
LINE   30        ETA2 = YRO - YUP                                                     00800300
LINE   31        T1 = SQRT( ETA1*ETA1 & ZRZR )                                        00800310
LINE   32        T2 = SQRT( ETA2*ETA2 & ZRZR )                                        00800320
LINE   33   10   CONTINUE                                                             00800330
LINE   34        R1 = ZETA1 - T1                                                      00800340
LINE   35        R2 = ZETA2 - T2                                                      00800350
LINE   36        IF( R1 .LE. 0.0 .AND.  R2 .LE. 0 ) RETURN                           00800360
LINE   37        R1 = R1*(ZETA1 & T1)                                                 00800370
LINE   38        R2 = R2*(ZETA2 & T2)                                                 00800380
LINE   39        IF( EREONE ) GO TO 90                                                00800390
LINE   40        EREONE = .TRUE.                                                      00800400
LINE   41        RTR = R1*R2                                                          00800410
LINE   42        IF( R1 .LT. 0.0 ) R1 = 0.0                                           00800420
LINE   43        IF( R2 .LT. 0.0 ) R2 = 0.0                                           00800430
LINE   44        R1 = SQRT( R1 )                                                      00800440
LINE   45        R2 = SQRT( R2 )                                                      00800450
LINE   46        RR = 0.5*( R1 & R2 )                                                 00800460
LINE   47        IF( SYMK.EQ. 0.0 ) RETURN                                            00800470
LINE   48        ETA1 = YLO - YLW                                                     00800480
LINE   49        ETA2 = YLO - YUP                                                     00800490
LINE   50        T1 = SQRT( ETA1*ETA1 & ZLZL )                                        00800500
LINE   51        T2 = SQRT( ETA2*ETA2 & ZLZL )                                        00800510
LINE   52        GO TO 10                                                             00800520
LINE   53   90   CONTINUE                                                             00800530
LINE   54        EMIRRO = .TRUE.                                                      00800540
LINE   55        RTL = R1*R2                                                          00800550
LINE   56        IF( R1 .LT. 0.0 ) R1 = 0.0                                           00800560
```

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LINE   57        IF( R2 .LT. 0.0 ) R2 = 0.0                          00800570
LINE   58        R1 = SQRT( R1 )                                     00800580
LINE   59        R2 = SQRT( R2 )                                     00800590
LINE   60        RL = 0.5*( R1 & R2 )                                00800600
LINE   61        RETURN                                              00800610
LINE   62        END                                                 00800620
```

DISPLAY...FILE DECK 09

```
LINE    1          SUBROUTINE FGEN                                                          00900010
LINE    2          REAL MACH                                                                00900020
LINE    3          COMMON/BASIC/MACH,BEETA                                                  00900030
LINE    4          COMMON / FQ1 / NFREQ, CF(12,30), FREQ(12), FREQP(12), FRTEST,NTMXX       00900040
LINE    5  C            NTMX      THE MAXIMUM NUMBER OF TERMS USED IN WINIGR, #VINT       00900050
LINE    6  C            XUNDER    MACHINE DEPENDENT NUMBER,LARGEST NEGATIVE EXPONENT      00900060
LINE    7          NTMX = 30                                                                00900070
LINE    8  CDC     XUNDER = -292.0                                                          00900080
LINE    9          XUNDER = -77.5                                                           00900090
LINE   10  C       WRITE( 6, 1001 )  NFREQ, ( FREQ (I), I=1,NFREQ )                         00900100
LINE   11          FRTEST =-1.0E&65                                                         00900110
LINE   12          DO 5 I=1,NFREQ                                                           00900120
LINE   13          FREQP(I) = FREQ(I)*MACH/BEETA                                            00900130
LINE   14        5 FRTEST = AMAX1( FREQP(I), FRTEST )                                       00900140
LINE   15  C       WRITE( 6, 1001 )  NFREQ, ( FREQP(I), I=1,NFREQ ), FRTEST                 00900150
LINE   16  C                                                                                00900160
LINE   17          NTMXX = 1                                                                00900170
LINE   18          DO 40 I = 1,NFREQ                                                        00900180
LINE   19          CF(I,1)  = 1.0                                                           00900190
LINE   20          XKK = FREQP(I)*FREQP(I)                                                  00900200
LINE   21          IF( XKK .GT. 0.0 ) GO TO 15                                              00900210
LINE   22          DO 10 J = 2,NTMX                                                         00900220
LINE   23       10 CF(I,J) = 0.0                                                            00900230
LINE   24          GO TO 40                                                                 00900240
LINE   25       15 CONTINUE                                                                 00900250
LINE   26          DO 30 J=2, NTMX                                                          00900260
LINE   27          N = J - 1                                                                00900270
LINE   28          N2 = N&N                                                                 00900280
LINE   29          FACTOR = XKK/FLOAT(N2*(N2-1))                                            00900290
LINE   30          A10 = ABS( CF(I,N) )                                                     00900300
LINE   31          A10 = ALOG10( A10 )  &  ALOG10( FACTOR )                                 00900310
LINE   32          IF( A10 .GE. XUNDER ) GO TO 25                                           00900320
LINE   33          DO 20  J1 = J,NTMX                                                       00900330
LINE   34       20 CF(I,J1) = 0.0                                                           00900340
LINE   35          NTMXX = MAX0( NTMXX, N  )                                                00900350
LINE   36          GO TO 40                                                                 00900360
LINE   37       25 CONTINUE                                                                 00900370
LINE   38          CF(I,J) = -CF(I,N)*FACTOR                                                00900380
LINE   39       30 CONTINUE                                                                 00900390
LINE   40          NTMXX = NTMX                                                             00900400
LINE   41  C                                                                                00900410
LINE   42       40 CONTINUE                                                                 00900420
LINE   43  C                                                                                00900430
LINE   44  C       DO 50 I = 1,NFREQ                                                        00900440
LINE   45  C       WRITE( 6, 1001 )  I, ( CF(I,J), J=1, NTMX  )                             00900450
LINE   46  C1001   FORMAT( // I8, 5X, 5E18.5 / ( 13X, 5E18.5 ) )                            00900460
LINE   47  C50     CONTINUE                                                                 00900470
LINE   48          RETURN                                                                   00900480
LINE   49          END                                                                      00900490
```

DISPLAY...FILE DECK 10

```
LINE    1        SUBROUTINE FREQw(I8,AROW,WROW      ,NF,LRECL)                  01000010
LINE    2        DIMENSION  WROW(LRECL), AROW( NWING)                          01000020
LINE    3        COMMON /FQ1/ NFREQ                                             01000030
LINE    4        COMMON/PARAM/ NWING                                            01000040
LINE    5        EQUIVALENCE (NET,NWINS )                                       01000050
LINE    6        READ(I8)  K1, WROW                                             01000060
LINE    7        K=NF                                                           01000070
LINE    8        DO 100   J=1,NWING                                             01000080
LINE    9        AROW(J) = WROW(K)                                              01000090
LINE   10        K =  K & NFREQ                                                 01000100
LINE   11    100  CONTINUE                                                      01000110
LINE   12        RETURN                                                         01000120
LINE   13        END                                                            01000130
```

DISPLAY...FILE DECK 11

```
LINE    1       SUBROUTINE GETTIM ( ITIME )                          01100010
LINE    2       DIMENSION ITIME(8)                                   01100020
LINE    3       CALL SECOND(A)                                       01100030
LINE    4       ITIME(2)  =  A * 1000.0                              01100040
LINE    5       RETURN                                               01100050
LINE    6       END                                                  01100060
```

DISPLAY...FILE DECK 12

```
LINE    1        SUBROUTINE GRIDIN( CORNX,CORNY,CORNZ,XYZ,Z,TRS,NNCH,SW,XLE,          01200010
LINE    2       1     NSP, NE, NETSV, REFLEN, NFREQ, FREQ,                           01200020
LINE    3       1     NWING, NSECT, ICL, ERROR, BEETA, LAB, ID, FD, I5, I6 )         01200030
LINE    4  C                                                                         01200040
LINE    5  C     PURPOSE  GENERATE MESH FOR 1 SECTION WHEN OPTIONAL DATA FOR A       01200050
LINE    6  C              PARTICULAR SECTION IS PRESENT, 'GRID' DATA                 01200060
LINE    7  C                                                                         01200070
LINE    8  C      INPUT                                                             01200080
LINE    9  C                                                                         01200090
LINE   10  C          I5      INPUT UNIT ( USUALLY CARD READER 5 )                   01200100
LINE   11  C          I6      OUTPUT UNIT ( PRINTER 6 )                              01200110
LINE   12  C          ERROR   LOGICAL THAT COMES IN FALSE,MAY BE SET TRUE            01200120
LINE   13  C          BEETA   SQRT(MACH*MACH-1) USED TO TRANSFORM CORNX AND CL       01200130
LINE   14  C          NWING   NO. WINGS IN STRUCTURE                                 01200140
LINE   15  C          NSECT   ARRAY  NO. SECTIONS IN EACH WING                       01200150
LINE   16  C          LAB, ID, FD  INFORMATION ON LAST CARD READ                     01200160
LINE   17  C          (BOTH INPUT AND OUTPUT)                                        01200170
LINE   18  C                                                                         01200180
LINE   19  C      OUTPUT                                                            01200190
LINE   20  C          CORNX,CORNY, CORNZ   X,Y, AND Z COORD. OF CORNER PTS 1,2,3,4  01200200
LINE   21  C                               IN GLOBAL SYSTEM                          01200210
LINE   22  C          NSP     DESIRED NUMBER OF SPANS FOR SECTION (INPUT BY USER)    01200220
LINE   23  C          XYZ     4 X AND 2 Y LOCAL COORD. FOR EACH ELEMENT OF SECTION   01200230
LINE   24  C          Z       Z COORDINATE FOR ALL ELEMENTS IN SECTION (FROM TRANS)  01200240
LINE   25  C          TRS     2 BY 2 TRANS MATRIX TO GO FROM LOCAL TO GLOBAL         01200250
LINE   26  C          NNCH    ELEMENT NUMBER (W.R.T. TOTAL STRUCTURE) OF LAST        01200260
LINE   27  C                  ELEMENT IN SPAN. (USED FOR LABELING PLOT)              01200270
LINE   28  C          SW      SPAN WIDTH                                             01200280
LINE   29  C          XLE     AVERAGE X COORDINATE OF LEADING EDGE PER SPAN          01200290
LINE   30  C          NE      NUMBER OF ELEMENTS IN SECTION.                         01200300
LINE   31  C          ICL     ICL(I,J) CODE FOR SECTION I OF WING J                  01200310
LINE   32  C                  ICL(I,J) = -1 SPECIFIC GRID INFORMATION IS INPUT       01200320
LINE   33  C               HERE ICL IS UPDATED IF ANOTHER 'GRID' SECTION IS ENCOUNT01200330
LINE   34  C               ERED AFTER READ PRESENT 'GRID' SECTION                    01200340
LINE   35  C          NETSV  COUNTER OF TOTAL NUMBER OF ELEMENTS IN STRUCTURE        01200350
LINE   36  C                                                                         01200360
LINE   37        LOGICAL ERROR                                                       01200370
LINE   38        LOGICAL FREQR                                                       01200380
LINE   39        DIMENSION CORNX(1), CORNY(1), CORNZ(1), TRS(1), X(4), Y(4)          01200390
LINE   40        DIMENSION FREQ(10)                                                  01200400
LINE   41        DIMENSION ID(9), FD(4)                                              01200410
LINE   42        DIMENSION XLE(1), SW(1)                                             01200420
LINE   43        DIMENSION XYZ(1), NNCH(40), ICL(3,4), NSECT(1)                      01200430
LINE   44        DATA  LB, LE, LC / 4H    , 4HEND , 4HCHOR  /                        01200440
LINE   45        DATA  LG, LS, LM, LF       /  4HGRID, 4HSPAN, 4HMODE, 4HFREQ  /    01200450
LINE   46  C                                                                         01200460
LINE   47  C          TRANSFORM CORNER POINTS TO LOCAL SYSTEM, WORK IN LOCAL SYSTEM01200470
LINE   48        CALL TRANS( CORNX, CORNY, CORNZ, TRS, X, Y, Z )                     01200480
LINE   49  C                                                                         01200490
LINE   50  C                                                                         01200500
LINE   51  C          'GRID' CARD MUST HAVE BEEN LAST CARD READ. (EITHER IN WINGIN   01200510
LINE   52  C          OR IN A PREVIOUSE CALL TO THIS ROUTINE - SEE 80 CONTINUE)      01200520
LINE   53  C                                                                         01200530
LINE   54        FREQR = .FALSE.                                                     01200540
LINE   55        JW = ID(1)                                                          01200550
LINE   56        IS = ID(2)                                                          01200560
```

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LINE   57          Y1 = Y(1) * REFLEN                                                    01200570
LINE   58  C             INITIALIZE ELEMENT AND SPAN COUNTERS (NE AND ISP)               01200580
LINE   59          NE = 0                                                                01200590
LINE   60          ISP = 0                                                               01200600
LINE   61  C                                                                             01200610
LINE   62          WRITE( I6, 3000 ) JW, IS                                              01200620
LINE   63  C                                                                             01200630
LINE   64    10    CONTINUE                                                              01200640
LINE   65          READ( I5, 1000 ) LAB, ID, FD                                          01200650
LINE   66  C                                                                             01200660
LINE   67          IF( LAB .EQ. LS ) GO TO 20                                            01200670
LINE   68          IF( LAB .EQ. LG ) GO TO 80                                            01200680
LINE   69          IF( LAB .EQ. LF ) GO TO 50                                            01200690
LINE   70          IF( LAB .EQ. LM ) GO TO 65                                            01200700
LINE   71          IF( LAB .EQ. LE ) GO TO 60                                            01200710
LINE   72          IF( LAB .EQ. LB ) GO TO 70                                            01200720
LINE   73  C                                                                             01200730
LINE   74  C             INVALID LABEL CARD READ                                         01200740
LINE   75          WRITE( I6, 2000 )                                                     01200750
LINE   76          WRITE( I6, 2018 )                                                     01200760
LINE   77          WRITE( I6, 2017 ) LAB, ID , FD                                        01200770
LINE   78          ERROR = .TRUE.                                                        01200780
LINE   79          GO TO 10                                                              01200790
LINE   80  C                                                                             01200800
LINE   81    20    CONTINUE                                                              01200810
LINE   82  C             'SPAN' CARD HAS BEEN READ. UPDATE SPAN COUNTER AND CHECK CARD  01200620
LINE   83  C                                                                             01200830
LINE   84          ISP = ISP & 1                                                         01200840
LINE   85          NC = ID(2)                                                            01200850
LINE   86          YSPAN = FD(1)                                                         01200860
LINE   87          IF( ID(1) .EQ. ISP ) GO TO 21                                         01200870
LINE   88  C             SPAN CARDS ARE OUT OF ORDER                                     01200880
LINE   89          WRITE( I6, 2000 )                                                     01200890
LINE   90          WRITE( I6, 2026 ) ID(1), ISP                                          01200900
LINE   91          ERROR = .TRUE.                                                        01200910
LINE   92    21    CONTINUE                                                              01200920
LINE   93          IF( YSPAN .GT. 0.0 ) GO TO 22                                         01200930
LINE   94  C             SPAN WIDTH LESS THAN OR EQUAL TO ZERO                           01200940
LINE   95          WRITE( I6, 2000 )                                                     01200950
LINE   96          WRITE( I6, 2027 ) ISP, YSPAN                                          01200960
LINE   97          ERROR = .TRUE.                                                        01200970
LINE   98      22  CONTINUE                                                              01200980
LINE   99          IF( NC .GT. 0 ) GO TO 23                                              01200990
LINE  100  C             NUMBER OF CHORD LINES MUST BE GREATER THAN OR EQUAL TO ZERO     01201000
LINE  101          WRITE( I6, 2000 )                                                     01201010
LINE  102          WRITE( I6, 2028) ISP                                                  01201020
LINE  103          ERROR = .TRUE.                                                        01201030
LINE  104      23  CONTINUE                                                              01201040
LINE  105  C                                                                             01201050
LINE  106          WRITE( I6, 3001 ) ISP, NC, YSPAN                                      01201060
LINE  107  C                                                                             01201070
LINE  108          Y2 = Y1 & YSPAN                                                       01201080
LINE  109  C             READ  1ST 'CHORD' CARD,  MUST BE LABELED 'CHORD'                01201090
LINE  110          READ( I5, 1000 ) LAB, ID, FD                                          01201100
LINE  111          IF( LAB .EQ. LC ) GO TO 24                                            01201110
LINE  112  C             CHORD CARD NOT FOUND                                            01201120
LINE  113          WRITE( I6, 2000 )                                                     01201130
LINE  114          WRITE( I6, 2029 ) ISP                                                 01201140
LINE  115          ERROR = .TRUE.                                                        01201150
LINE  116    24    CONTINUE                                                              01201160
LINE  117          IC = 1                                                                01201170
LINE  118          X1 = FD(1)                                                            01201180
```

```
LINE 119          X2 = FD(2)                                                    01201190
LINE 120    C                                                                   01201200
LINE 121          WRITE( I6, 3002 ) IC, X1, X2                                  01201210
LINE 122          X2 = X2/BEETA                                                 01201220
LINE 123          X1 = X1/BEETA                                                 01201230
LINE 124          SW(ISP) = YSPAN/REFLEN                                        01201240
LINE 125          XLE(ISP) = 0.5*(X1&X2)/REFLEN                                 01201250
LINE 126    C                                                                   01201260
LINE 127    C          LOOP ON NUMBER OF CHORD CARDS  2,NC                      01201270
LINE 128          DO 30 IC = 2, NC                                              01201280
LINE 129    C                                                                   01201290
LINE 130          READ( I5, 1000 )  LAB, ID, X4, X3                             01201300
LINE 131    C                                                                   01201310
LINE 132          WRITE( I6, 3002 ) IC, X4, X3                                  01201320
LINE 133          X3 = X3/BEETA                                                 01201330
LINE 134          X4 = X4/BEETA                                                 01201340
LINE 135    C                                                                   01201350
LINE 136          XMIN = AMIN1( (X4-X1),  (X3-X2) )                             01201360
LINE 137          IF( XMIN .GT. 0.0 ) GO TO 25                                  01201370
LINE 138          XMAX = AMAX1( (X4-X1), (X3-X2) )                              01201380
LINE 139          IF( XMIN .EQ. 0.0  .AND.  XMAX .GT. 0.0 ) GO TO 25            01201390
LINE 140          WRITE( I6, 2000 )                                             01201400
LINE 141          WRITE( I6, 2031 ) IC, ISP                                     01201410
LINE 142          ERROR = .TRUE.                                                01201420
LINE 143     25   CONTINUE                                                      01201430
LINE 144    C                                                                   01201440
LINE 145          NJ = 6*NE                                                     01201450
LINE 146          NE = NE&1                                                     01201460
LINE 147          XYZ(NJ&1) = X1/REFLEN                                         01201470
LINE 148          XYZ(NJ&2) = X2/REFLEN                                         01201480
LINE 149          XYZ(NJ&3) = X3/REFLEN                                         01201490
LINE 150          XYZ(NJ&4) = X4/REFLEN                                         01201500
LINE 151          XYZ(NJ&5) = Y1/REFLEN                                         01201510
LINE 152          XYZ(NJ&6) = Y2/REFLEN                                         01201520
LINE 153          X1 = X4                                                       01201530
LINE 154          X2 = X3                                                       01201540
LINE 155     30   CONTINUE                                                      01201550
LINE 156    C                                                                   01201560
LINE 157          Y1 = Y2                                                       01201570
LINE 158          NNCH(ISP) = NE & NETSV                                        01201580
LINE 159    C                                                                   01201590
LINE 160          GO TO 10                                                      01201600
LINE 161    C                                                                   01201610
LINE 162     50   CONTINUE                                                      01201620
LINE 163    C          FREQUENCY CARD READ                                      01201630
LINE 164          FREQR = .TRUE.                                                01201640
LINE 165          DO 55  I =1, 4                                                01201650
LINE 166     55   FREQ(I) = FD(I)                                               01201660
LINE 167          NFREQ = ID(1)                                                 01201670
LINE 168          IF( NFREQ .GT. 4 ) READ( I5, 1001 ) ( FREQ(I), I=5, NFREQ )   01201680
LINE 169          WRITE( I6, 3006 )       NFREQ, ( FREQ(I), I=1,NFREQ)          01201690
LINE 170          GO TO 10                                                      01201700
LINE 171    C                                                                   01201710
LINE 172     60   CONTINUE                                                      01201720
LINE 173    C          END CARD READ                                            01201730
LINE 174    C          BOTH MODE AND FREQUENCY DATA MISSING                     01201740
LINE 175          WRITE( I6, 2000 )                                             01201750
LINE 176          WRITE( I6, 2014 )                                             01201760
LINE 177          WRITE( I6, 2015 )                                             01201770
LINE 178          ERROR = .TRUE.                                                01201780
LINE 179          GO TO 90                                                      01201790
LINE 180    C                                                                   01201800
```

```
LINE 181     65  CONTINUE                                                    01201810
LINE 182         IF( FREQR ) GO TO 90                                        01201820
LINE 183         WRITE( I6, 2000 )                                           01201830
LINE 184         WRITE( I6, 2015 )                                           01201840
LINE 185         ERROR = .TRUE.                                              01201850
LINE 186         GO TO 90                                                    01201860
LINE 187  C                                                                  01201870
LINE 188     70  CONTINUE                                                    01201880
LINE 189  C           LABEL CARD EXPECTED BUT NOT RECEIVED                   01201890
LINE 190         WRITE( I6, 2000 )                                           01201900
LINE 191         WRITE( I6,2016 )                                            01201910
LINE 192         WRITE( I6, 2017 ) LAB, ID , FD                              01201920
LINE 193         ERROR = .TRUE.                                              01201930
LINE 194         GO TO 10                                                    01201940
LINE 195  C                                                                  01201950
LINE 196     80  CONTINUE                                                    01201960
LINE 197  C           GRID CARD READ                                         01201970
LINE 198  C                                                                  01201980
LINE 199         I = ID(2)                                                   01201990
LINE 200         J = ID(1)                                                   01202000
LINE 201         IF( I .GT. NSECT(J) ) GO TO 81                              01202010
LINE 202         IF( I .GT. NWING ) GO TO 81                                 01202020
LINE 203         IF( J .LT. JW ) GO TO 82                                    01202030
LINE 204         IF( J .EQ. JW  .AND.  I .LE. IS ) GO TO 82                  01202040
LINE 205         ICL(I,J) = -1                                               01202050
LINE 206         GO TO 90                                                    01202060
LINE 207     81  CONTINUE                                                    01202070
LINE 208  C           GRID DATA SPECIFIED FOR SECTION THAT DOES NOT EXIST     01202080
LINE 209         WRITE( I6, 2000 )                                           01202090
LINE 210         WRITE( I6, 2020 )                                           01202100
LINE 211         WRITE( I6, 2021 ) J, I                                      01202110
LINE 212         ERROR = .TRUE.                                              01202120
LINE 213         GO TO 90                                                    01202130
LINE 214     82  CONTINUE                                                    01202140
LINE 215  C           GRID DATA FOR NEXT GRID SECTION IS OUT OF ORDER         01202150
LINE 216         WRITE( I6, 2000 )                                           01202160
LINE 217         WRITE( I6, 2022 ) J, I                                      01202170
LINE 218         ERROR = .TRUE.                                              01202180
LINE 219  C                                                                  01202190
LINE 220     90  CONTINUE                                                    01202200
LINE 221  C                                                                  01202210
LINE 222  C           SECTION TO RETURN                                      01202220
LINE 223         NETSV = NETSV & NE                                          01202230
LINE 224         IF( ISP .EQ. NSP ) RETURN                                   01202240
LINE 225  C           NUMBER OF SPAN CARDS READ DOES NOT AGREE WITH NO. SPANS (NSP)01202250
LINE 226         WRITE( I6, 2030 ) IS, JW, NSP, ISP                          01202260
LINE 227         RETURN                                                      01202270
LINE 228  C                                                                  01202280
LINE 229   1000 FORMAT( A4, 2X, 9I2, 4E12.0 )                               01202290
LINE 230   1001 FORMAT( 24X, 4E12.0 )                                       01202300
LINE 231  C                                                                  01202310
LINE 232   2000 FORMAT(/// 1X, 129(1H*) //24H ERROR IN READING INPUT.    )  01202320
LINE 233   2014 FORMAT(37H MODE DATA IS MISSING OR OUT OF ORDER )            01202330
LINE 234   2015 FORMAT(42H FREQUENCY DATA IS MISSING OR OUT OF ORDER )       01202340
LINE 235   2016 FORMAT( 42H A LABEL CARD IS EXPECTED BUT NOT PRESENT. )      01202350
LINE 236   2017 FORMAT(                                          67H CARD WILL B01202360
LINE 237       1E PRINTED ON FOLLOWING LINE AND NEXT CARD WILL BE READ. / 1X,  01202370
LINE 238       2 A4, 2X, 9I2,4E12.0 )                                        01202380
LINE 239   2018 FORMAT( 32H AN INVALID LABEL CARD WAS READ. )                01202390
LINE 240   2020 FORMAT( 27H ERROR ON GRID LABEL CARD. )                      01202400
LINE 241   2021 FORMAT( 27H GRID DATA PRESENT FOR WING, I2, 8H SECTION, I2 / 01202410
LINE 242       1 53H THIS SECTION HAS NOT BEEN DEFINED FOR THE STRUCTURE.  ) 01202420
```

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LINE 243    2022 FORMAT( 19H GRID DATA FOR WING, I2,  8H SECTION, I2, 17H IS OUT OF01202430
LINE 244        1 ORDER. )                                                        01202440
LINE 245    2026 FORMAT( 43H SPAN CARDS ARE OUT OF ORDER. CARD FOR SPAN, I2,      01202450
LINE 246        1 28H WAS READ WHEN CARD FOR SPAN, I2, 13H WAS EXPECTED  )        01202460
LINE 247    2027 FORMAT( 25H THE WIDTH OF SPAN NUMBER, I2,  7H EQUALS, E14.6 /    01202470
LINE 248        1  42H THE SPAN WIDTH MUST BE GREATER THAN ZERO. )                01202480
LINE 249    2028 FORMAT( 34H THE NUMBER OF CHORD LINES IN SPAN, I2, 7H EQUALS, I3 /01202490
LINE 250        1 48H THE NUMBER OF CHORDS MUST BE GREATER THAN ZERO. )           01202500
LINE 251    2029 FORMAT( 20H CHORD CARD FOR SPAN, I3,10H NOT FOUND )              01202510
LINE 252    2030 FORMAT(  8H SECTION, I2, 8H OF WING, I2, 20H WAS DEFINED TO HAVE, 01202520
LINE 253        1  I3, 7H SPANS., I4, 33H 'SPAN' CARDS WERE ACTUALLY READ.   )    01202530
LINE 254    2031 FORMAT(18H CHORD LINE NUMBER, I3,  8H OF SPAN, I3,               01202540
LINE 255        1 62H IS IDENTICAL TO, CROSSES, OR IS ABOVE THE PREVIOUS CHORD LINE01202550
LINE 256        2   )                                                           01202560
LINE 257    C                                                                   01202570
LINE 258    3000 FORMAT(1H1/24X, 19HGRID INPUT FOR WING, I2, 8H SECTION, I2 )   01202580
LINE 259    3001 FORMAT(/ 24X, 4HSPAN, I3, 4H HAS, I3,27H CHORD LINES AND A WIDTH 01202590
LINE 260        1F,  E13.6  / 24X,     5HCHORD,  9X, 2HX1, 14X, 2HX2 )          01202600
LINE 261    3002 FORMAT( 24X, I5, 5X, 2E16.6 )                                  01202610
LINE 262    3006 FORMAT(                          // // 20X, 21HNUMBER OF FREQUENCI01202620
LINE 263        1ES, I12  / 20X, 19HLIST OF FREQUENCIES, 5F14.4 / (39X, 5F14.4) ) 01202630
LINE 264         END                                                            01202640
```

```
NO READ
```

```
OF JOB.

   39.4 SEC. USED     .011 HRS. CHARGED    49.974 HRS. REMAINING
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DISPLAY...FILE DECK 13

```
LINE    1          SUBROUTINE INP1( I5, I6, TITLE, ITRUN, MACH, REFLEN, XP, XPIN,     01300010
LINE    2         1   PLOTR, IWTE,EARO, BEETA, LAB, ID, FD, ERROR )                  01300020
LINE    3          REAL MACH                                                         01300030
LINE    4          LOGICAL ERROR, PLOTR                                              01300040
LINE    5          DIMENSION TITLE(14), FD(4), ID(9)                                 01300050
LINE    6          COMMON / NEXTCS /  IFLUSH                                         01300060
LINE    7          DATA  LRUN  /  4HRUN  /                                           01300070
LINE    8  C            EARO   ELEMENT ASPECT RATIO                                 01300080
LINE    9  C                                                                        01300090
LINE   10  C            READ RUN CARD                                               01300100
LINE   11  C                                                                        01300110
LINE   12          READ( I5, 1000 ) LAB, ID, FD                                      01300120
LINE   13  C                                                                        01300130
LINE   14          IF( LAB .EQ. LRUN ) GO TO 2                                       01300140
LINE   15          WRITE( I6, 2000 )                                                 01300150
LINE   16          WRITE( I6, 2023 )                                                 01300160
LINE   17          IFLUSH = 1                                                        01300170
LINE   18     2    CONTINUE                                                         01300180
LINE   19          ITRUN = ID(1)                                                     01300190
LINE   20          PLOTR = .FALSE.                                                   01300200
LINE   21          IF( ID(2) .EQ. 1 ) PLOTR = .TRUE.                                 01300210
LINE   22          IWTE = 0                                                          01300220
LINE   23          IF( ID(3) .EQ. 1 ) IWTE = 1                                       01300230
LINE   24          MACH = FD(1)                                                      01300240
LINE   25          BEETA=SQRT(MACH*MACH-1.0)                                         01300250
LINE   26          REFLEN = FD(2)                                                    01300260
LINE   27          XPIN = FD(3)                                                      01300270
LINE   28          EARO = FD(4)                                                      01300280
LINE   29          IF( EARO .EQ. 0.0)EARO = 1.1                                      01300290
LINE   30          IF( MACH .GT. 1.0 ) GO TO 5                                       01300300
LINE   31          WRITE( I6, 2000 )                                                 01300310
LINE   32          WRITE( I6,2024 ) MACH                                             01300320
LINE   33          MACH = 2.0                                                        01300330
LINE   34          ERROR = .TRUE.                                                    01300340
LINE   35     5    CONTINUE                                                         01300350
LINE   36          IF( REFLEN .NE. 0.0 ) GO TO 6                                     01300360
LINE   37          WRITE( I6, 2000 )                                                 01300370
LINE   38          WRITE( I6, 2025 )                                                 01300380
LINE   39          ERROR = .TRUE.                                                    01300390
LINE   40          REFLEN = 1.                                                       01300400
LINE   41     6    CONTINUE                                                         01300410
LINE   42          IF ( EARO  .GT. 0.0 ) GO TO 7                                     01300420
LINE   43          WRITE( I6, 2000 )                                                 01300430
LINE   44          WRITE( 6, 2027 ) EARO                                             01300440
LINE   45          ERROR = .TRUE.                                                    01300450
LINE   46          EARO = 1.0                                                        01300460
LINE   47     7    CONTINUE                                                         01300470
LINE   48          XP = XPIN/(BEETA*REFLEN)                                          01300480
LINE   49          WRITE( I6, 3007 ) MACH, REFLEN, XPIN                              01300490
LINE   50          WRITE( I6, 3019 ) EARO                                            01300500
LINE   51          WRITE( I6, 3008 ) ITRUN                                           01300510
LINE   52          IF( ITRUN .EQ. 3 ) GO TO 88                                       01300520
LINE   53          IF( ITRUN .NE. 1 ) GO TO 8                                        01300530
LINE   54          WRITE( I6, 3009 )                                                 01300540
LINE   55          GO TO 9                                                           01300550
LINE   56    88    CONTINUE                                                         01300560
```

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LINE   57          WRITE( I6, 3018 )                                                    01300570
LINE   58          GO TO 9                                                              01300580
LINE   59    8     CONTINUE                                                             01300590
LINE   60          WRITE(I6, 3010 )                                                     01300600
LINE   61    9     CONTINUE                                                             01300610
LINE   62          WRITE( I6, 3011 ) ID(2)                                              01300620
LINE   63          IF( PLOTR ) GO TO 11                                                 01300630
LINE   64          WRITE( I6,3012)                                                      01300640
LINE   65          GO TO 12                                                             01300650
LINE   66     11   CONTINUE                                                             01300660
LINE   67          WRITE( I6, 3013 )                                                    01300670
LINE   68     12   CONTINUE                                                             01300680
LINE   69          WRITE( I6, 3015 ) IWTE                                               01300690
LINE   70          IF( IWTE .NE. 1 ) WRITE( I6, 3016 )                                  01300700
LINE   71          IF( IWTE .EQ. 1 ) WRITE( I6, 3017 )                                  01300710
LINE   72          RETURN                                                               01300720
LINE   73    1000 FORMAT( A4, 2X, 9I2, 4E12.0 )                                         01300730
LINE   74    2000 FORMAT(/// 1X, 129(1H*) //24H ERROR IN READING INPUT.    )           01300740
LINE   75    2023 FORMAT( 38H RUN CARD IS MISSING OR OUT OF ORDER / 89H RUN CARD MUS   01300750
LINE   76        1T IMMEDIATELY FOLLOW THE TITLE CARD AND BE THE SECOND CARD IN THE    01300760
LINE   77        2INPUT DECK / 18H JOB IS TERMINATED  )                               01300770
LINE   78    2024 FORMAT( 37H MACH NUMBER MUST BE GREATER THAN 1.0  / 24H MACH NUMBE   01300780
LINE   79        1R WAS READ AS, E13.6 / 80H MACH NUMBER WILL BE SET EQUAL TO 2.0 IN   01300790
LINE   80        2 AN ATTEMP TO CHECK THE REST OF THE DATA // )                        01300800
LINE   81    2025 FORMAT(  56H REFERENCE LENGTH WAS READ AS 0.0.  THIS IS NOT ALLOWE   01300810
LINE   82        1D. /  87H REFERENCE LENGTH WILL BE SET EQUAL TO 1.0 IN AN ATTEMPT    01300820
LINE   83        2TO CHECK THE REST OF THE DATA./116H REFERENCE LENGTH MUST BE INPUT   01300830
LINE   84        3 AS A NON-ZERO FLOATING POINT NUMBER IN COLUMNS 39 THROUGH 48 OF T   01300840
LINE   85        4HE 'RUN' DATA CARD. // )                                            01300850
LINE   86    2026 FORMAT(     92H OFF-DIAGONAL PERCENTAGE, IF ENTERED, MUST BE GREATE   01300860
LINE   87        1R THAN OR EQUAL TO 0.0 AND LESS THAN 1.0 / 37H OFF-DIAGONAL PERCEN   01300870
LINE   88        2TAGE WAS INPUT AS, E16.6 // )                                       01300880
LINE   89    2027 FORMAT(     61H ELEMENT ASPECT RATIO, IF ENTERED, MUST BE A POSITIV   01300890
LINE   90        1E NUMBER. /33H ELEMENT ASPECT RATIO WAS READ AS, E13.6 /             01300900
LINE   91        2 97H ELEMENT ASPECT RATIO WILL BE SET EQUAL TO 1.0 IN AN ATTEMPT T   01300910
LINE   92        3O CHECK THE REST OF THE INPUT DATA. / )                             01300920
LINE   93    3007 FORMAT( 20X, 11HMACH NUMBER, F22.5 // 20X,16HREFERENCE LENGTH,      01300930
LINE   94        1 F17.5  //  20X, 20HPITCHING MOMENT AXIS, F13.5  )                  01300940
LINE   95    3008 FORMAT( / 20X, 13HRUN TYPE CODE,  I20 )                            01300950
LINE   96    3009 FORMAT( 20X, 22H(COMPLETE RUN ATTEMPT))                            01300960
LINE   97    3010 FORMAT( 20X, 11H(CHECK RUN)  )                                     01300970
LINE   98    3011 FORMAT( / 20X,17HPLOT REQUEST CODE, I16 )                          01300980
LINE   99    3012 FORMAT( 20X, 24H(NO PLOTS ARE REQUESTED)  )                        01300990
LINE  100    3013 FORMAT( 20X, 21H(PLOTS ARE REQUESTED)  )                           01301000
LINE  101    3014 FORMAT( /20X,23HOFF-DIAGONAL PERCENTAGE, F10.5 )                   01301010
LINE  102    3015 FORMAT( / 20X, 16HWAKE EFFECT CODE, I17 )                          01301020
LINE  103    3016 FORMAT( 20X,   31H(WAKE EFFECT IS NOT CONSIDERED)  )               01301030
LINE  104    3017 FORMAT( 20X,   27H(WAKE EFFECT IS CONSIDERED) )                    01301040
LINE  105    3018 FORMAT( 20X, 13H(RESTART RUN)  )                                   01301050
LINE  106    3019 FORMAT( / 20X, 20HELEMENT ASPECT RATIO, F13.5 )                    01301060
LINE  107          END                                                               01301070
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DISPLAY...FILE DECK 14

```
LINE    1        FUNCTION IRELE    ( GT,GW,NET)                                                    01400010
LINE    2        COMPLEX  GBAR, RI, RIS                                                            01400020
LINE    3        COMMON / CEPS /   EPS                                                             01400030
LINE    4        COMPLEX   GT(1), GW(1)                                                            01400040
LINE    5        IRELE =1                                                                          01400050
LINE    6        ANET = NET                                                                        01400060
LINE    7        RABSO = 0.0                                                                       01400070
LINE    8        DO 600          IEL=1,NET                                                         01400080
LINE    9        GTABS=  CABSO(GT(IEL) )                                                           01400090
LINE   10        GABSW=  CABSO ( GW(IEL))                                                          01400100
LINE   11        IF (GABSW .EQ. 0.0  .AND. GTABS .EQ. 0.0)    ANET = ANET -1.0                     01400110
LINE   12        IF (GABSW .EQ. 0.0  .AND. GTABS .EQ. 0.0)    GO TO 600                            01400120
LINE   13        RI =  GT(IEL) -GW(IEL)                                                            01400130
LINE   14        RIS=  RI * RI                                                                     01400140
LINE   15        IF( GTABS.NE. 0.0)    RIS =  RIS / GT(IEL)                                        01400150
LINE   16   600  RABSO  =  CABSO( RIS)+RABSO                                                       01400160
LINE   17        ERROR   =   RABSO /  ANET                                                         01400170
LINE   18        ERROR   =   SQRT( ERROR)                                                          01400180
LINE   19        IF (ERROR.GT.EPS    )          RETURN                                             01400190
LINE   20        IRELE = 0                                                                         01400200
LINE   21        RETURN                                                                            01400210
LINE   22        END                                                                               01400220
```

DISPLAY...FILE DECK 15

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LINE    1        SUBROUTINE ITRATE (I,9, NWR,A,I[illegible]MC,D,IP,DNWR,DNWI, RWR,RWI,01500010
LINE    2       1 NET, A, IZ ,GWESS,WW)                                          01500020
LINE    3        COMPLEX GW, GT,WW                                               01500030
LINE    4        COMPLEX GWESS                                                   01500040
LINE    5        REAL NWR, NWI                                                   01500050
LINE    6        INTEGER PRINT                                                   01500060
LINE    7        DIMENSION A(NET)., IZ(NET)                                      01500070
LINE    8        DIMENSION D(MC,MC) , IP(MC),DNWR(MC),DNWI(MC), RWR(MC), RWI(MC) 01500080
LINE    9        DIMENSION  GWESS(200)                                           01500090
LINE   10        DIMENSION      NWR(200),NWI(200),GW(200),GT(200)                01500100
LINE   11        DIMENSION WW(200)                                               01500110
LINE   12        COMMON  /CEPS/ EPS                                              01500120
LINE   13        COMMON /ITERAT/ ITMAX                                           01500130
LINE   14        COMMON /ITG/  IGWESS                                            01500140
LINE   15        COMMON /K1112/ KST11,KST12                                      01500150
LINE   16        COMMON /TAPE/  IN, I10                                          01500160
LINE   17        COMMON / VELCOM / NMAX, PRINT, NWBLOK, NWROW( 20),              01500170
LINE   18        REWIND I10                                                      01500180
LINE   19        NWING = NET                                                     01500190
LINE   20        IF (NWBLOK .EQ. 1)   GO TO 700                                  01500200
LINE   21        IMAX=50                                                         01500210
LINE   22        IF (ITMAX.NE.0) IMAX=ITMAX                                      01500220
LINE   23  C                                                                     01500230
LINE   24  C                                                                     01500240
LINE   25  C     SET CONVERGENCE CRITERIA - EPS                                   01500250
LINE   26  C                                                                     01500260
LINE   27  C                                                                     01500270
LINE   28        ALF1=0.9                                                        01500280
LINE   29        ALF2=1.1                                                        01500290
LINE   30     10 ALF=ALF1                                                        01500300
LINE   31        REWIND I9                                                       01500310
LINE   32        DO 90 N=1,NWING                                                 01500320
LINE   33        GT(N)=0.                                                        01500330
LINE   34     90 CONTINUE                                                        01500340
LINE   35    100 IT=1                                                           01500350
LINE   36        ITEST=0                                                         01500360
LINE   37        IF(IGWESS.NE.0) GO TO 166                                       01500370
LINE   38    700 CONTINUE                                                       01500380
LINE   39        IW=1                                                            01500390
LINE   40        IW1= 1                                                          01500400
LINE   41        DO 160       NN=1,NWBLOK                                        01500410
LINE   42        NROW=NWROW(NN).                                                 01500420
LINE   43        NCOL=NROW                                                       01500430
LINE   44        READ(I10) D, IP                                                 01500440
LINE   45        DO 155 I=1,NROW                                                 01500450
LINE   46        RWR(I) = NWR(IW1)                                               01500460
LINE   47        RWI(I) = NWI(IW1)                                               01500470
LINE   48        IW1= IW1&1                                                      01500480
LINE   49    155 CONTINUE                                                        01500490
LINE   50        CALL  SOLVE(NROW,NMAX,D,RWR     ,IP)                            01500500
LINE   51        CALL  SOLVE(NROW,NMAX,D,RWI     ,IP)                            01500510
LINE   52        CALL   TMAX( NET, RWR, RMAXR)                                   01500520
LINE   53        CALL   TMAX( NET, RWI, RMAXI)                                   01500530
LINE   54    148 DO 150 J=1,NCOL                                                 01500540
LINE   55        GW(IW)=CMPLX(RWR(J),RWI(J))                                     01500550
LINE   56        IW=IW&1                                                         01500560
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      150 CONTINUE                                                          01500570
      160 CONTINUE                                                          01500580
    166  CONTINUE                                                          01500590
         IF(NWBLOK.EQ.1) GO TO 530                                         01500600
    172  CONTINUE                                                          01500610
         REWIND I10                                                        01500620
      190 IF (IABS(PRINT).LT.3) GO TO 200                                  01500630
C        WRITE (6,630) IT                                                  01500640
C                          WRITE (6,650) NWING,(GW(N),N=1,NWING)           01500650
      200 CONTINUE                                                         01500660
         IF (ITEST.EQ.0.AND.IT.NE.1) GO TO 530                             01500670
         IF (IT.EQ.IMAX) GO TO 540                                         01500680
      330 JJ=0                                                             01500690
         IT=IT&1                                                           01500700
         II=1                                                              01500710
         ITEST=0                                                           01500720
         REWIND  I9                                                        01500730
         REWIND  I10                                                       01500740
         JJ=0                                                              01500750
         II=1                                                              01500760
         L=0                                                               01500770
         L1=0                                                              01500780
         DO 510 I=1,NWBLOK                                                 01500790
         NROW=NWROW(I)                                                     01500800
         READ (I10) D,IP                                                   01500810
C        IF ( IABS(PRINT) .LT. 3)   GO TO  340                             01500820
C        WRITE (6,564)    I,NROW                                           01500830
C        WRITE (6,566) NROW,D                                              01500840
C566     FORMAT(1H0,  7HITRATE ,   7HNROW = , I3, / (1X,10F10.5))          01500850
C        WRITE (6,562) NROW,IP                                             01500860
C340     CONTINUE                                                          01500870
C562     FORMAT(1H0,  7HITRATE ,   7HNROW = , I3, / (1X,10F10.5))          01500880
C564     FORMAT(1H0,  7HITRATE ,  10HBLOCK NO. , I13, I18,  5H ROWS )      01500890
         DO 471 J=1,NROW                                                   01500900
         L= L&1                                                            01500910
         DNWR(J)=0.0                                                       01500920
         DNWI(J)=0.0                                                       01500930
C        IF (NWING.LE.NMAX) GO TO 470                                      01500940
         IF(L.GT. KST11) NNZ =0                                            01500950
         IF(L.GT. KST11) GO TO 470                                         01500960
         IF(L1.LT. L )                                                     01500970
        1READ( I9)  L1, NNZ, (IZ(M),M=1,NNZ), (A(M),M=1,NNZ)               01500980
         IF(L1.GT.L)  NNZ=0                                                01500990
         IF(NNZ  .EQ. 0)  GO TO 470                                        01501000
         DO 460          M=1,NNZ                                           01501010
          K= IZ(M )                                                        01501020
         DNWR(J)= DNWR(J) & A(M) * REAL  (GW(K)).                          01501030
     460 DNWI(J)= DNWI(J) & A(M) * AIMAG( GW(K))                           01501040
     470 RWR(J)= NWR(J&JJ) -DNWR(J)                                        01501050
         RWI(J)= NWI(J&JJ) -DNWI(J)                                        01501060
         IF (IABS(PRINT).LT. 3)   GO TO 471                                01501070
C        WRITE(6, 3000)   J, J1,DNW(J), NW(J),RW(J)                        01501080
C3000    FORMAT(4X, 27H J,J1,DNW(J),NW(J),RW(J) =     /(6X, 2I4,6E12.4) )  01501090
      471 CONTINUE                                                         01501100
         CALL SOLVE ( NROW,NMAX,D,RWR, IP )                                01501110
         CALL  SOLVE (NROW,NMAX,D,RWI, IP )                                01501120
         DO 500 M=1,NROW                                                   01501130
         GT(II)=GW(II)                                                     01501140
         SAVE=WW(II)                                                       01501150
         GW(II) =  CMPLX( RWR(M), RWI(M))                                  01501160
         WW(II)=GW(II)-GT(II).                                             01501170
         IF(IT .EQ.2)      GO TO 490                                       01501180
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LINE 119          SAVE=WW(II)*SAVE                                                    01501190
LINE 120          ALF=ALF1                                                            01501200
LINE 121          IF (SAVE.GE.0.) ALF=ALF2                                            01501210
LINE 122       490 CONTINUE                                                           01501220
LINE 123          GW(II)=ALF*GW(II)&(1.-ALF)*GT(II)                                   01501230
LINE 124    C     ITEST = IRELE(GT(II), GW(II),  ITEST)                               01501240
LINE 125          II=II&1                                                             01501250
LINE 126       500 CONTINUE                                                           01501260
LINE 127          JJ=JJ&NWROW(I)                                                      01501270
LINE 128       510 CONTINUE                                                           01501280
LINE 129          ITEST =  IRELE(GT, GW,NET)                                          01501290
LINE 130          GO TO 190                                                           01501300
LINE 131       530 WRITE (6,580) IT,EPS                                               01501310
LINE 132           RETURN                                                             01501320
LINE 133       540 WRITE (6,590) IMAX,EPS                                             01501330
LINE 134    C     IF (IMETH.EQ.0) GO TO 550                                           01501340
LINE 135    C     IMETH=0                                                             01501350
LINE 136    C     GO TO 60                                                            01501360
LINE 137       550 CONTINUE                                                           01501370
LINE 138          WRITE (6,600)                                                       01501380
LINE 139                              WRITE (6,650) NWING,(GT(N),N=1,NWING)           01501390
LINE 140     560  WRITE (6,610)                                                      01501400
LINE 141                              WRITE (6,650) NWING,(GW(N),N=1,NWING)           01501410
LINE 142          RETURN                                                              01501420
LINE 143    C                                                                         01501430
LINE 144    C                                                                         01501440
LINE 145       570 FORMAT (2X,10HRW(N),N=1,,I3/(1X,10F10.5))                          01501450
LINE 146       580 FORMAT (1HO,30HTHE ITERATION CONVERGED AFTER ,I3,2X,35HITERATIONS 01501460
LINE 147         1WITH A TEST CRITERION OF,F10.7)                                     01501470
LINE 148       590 FORMAT (1HO,37HTHE ITERATION DID NOT CONVERGE AFTER ,I3,2X,35HITER01501480
LINE 149         1ATIONS WITH A TEST CRITERION OF,F10.7)                              01501490
LINE 150       600 FORMAT (1HO,41HTHE SOLUTION AT THE PREVIOUS ITERATION IS)          01501500
LINE 151       610 FORMAT (1HO,40HTHE SOLUTION AT THE PRESENT ITERATION IS)           01501510
LINE 152       630 FORMAT (17HOITERATION NUMBER,I4)                                   01501520
LINE 153      650  FORMAT( 2X,10HGW(N),N=1,,I3/(4X, 6E18.6))                         01501530
LINE 154    C                                                                         01501540
LINE 155          END                                                                 01501550
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DISPLAY...FILE          DECK 16

LINE    1          SUBROUTINE LOOPW( NET,        NWING, XYZ, NSP, SYM, TRS, NNCH, NE,01600010
LINE    2         1   NSECT, ZSECT, ISONS, I6, TAPE8, XCEN, AREA, WROW, LRECL,        01600020
LINE    3         2 WTEROW,LRWTE,PERC,ERROR, IWTE, REFLEN)                           01600030
LINE    4   C           NET     TOTAL NUMBER OF ELEMENTS                             01600040
LINE    5   C           NTERM     NUMBER OF TERMS IN INFLUENCE FUNCTION              01600050
LINE    6   C           NWING     NUMBER OF WINGS IN STRUCTURE                       01600060
LINE    7   C           XYZ     COORDINATE ARRAY OF ALL ELEMENTS                     01600070
LINE    8   C           NSP     NSP(I,J), NO. SPANS IN SECTION I OF WING J           01600080
LINE    9   C           SYM(J)  SYMMETY CODE FOR WING J                              01600090
LINE   10   C           TRS     TRS(I,J,1)  TRANSFORMATION MATRIX OF SECT. I OF WING J01600100
LINE   11   C           NNCH    ELEMENT NUMBER AT END OF SPAN                        01600110
LINE   12   C           NE(I,J) NUMBER OF ELEMENTS IN SECTION I OF WING J             01600120
LINE   13   C           NSECT(5) NUMBER OF SECTIONS IN WING J                        01600130
LINE   14   C           ZSECT(I,J) Z COORDINATE OF ALL ELEMENTS OF SECTION I, WING J 01600140
LINE   15   C           ISONS  BOOLEAN MATRIX TO TELL IF ONE SECTION HAS INFLUENCE   01600150
LINE   16   C           ISONS(K1,K2) = 1 IF SETION K2 HAS INFLU. ON REC. SECTION K1  01600160
LINE   17   C           I6      LOGICAL UNIT NUMBER FOR OUTPUT (PRINTER)             01600170
LINE   18   C           TAPE8   LOGICAL UNIT NUMBER OF TAPE TO CONTAIN FREQUENCY-INDE-01600180
LINE   19   C                   PENDENT TERMS                                        01600190
LINE   20   C           XCEN    X CENTER OF EACH ELEMENT (OUTPUT)                    01600200
LINE   21   C           XO        X COORDINATE OF RECEIVING PT. (CENTER OF ELEMENT ) 01600210
LINE   22   C           YRO       Y COORDINATE OF RECEIVING PT. (IN RIGHT SIDE )   . 01600220
LINE   23   C           YLO       Y COORDINATE OF RECEIVING PT. (IN LEFT SIDE ))     01600230
LINE   24   C           AREA    AREA FOR EACH ELEMENT (OUTPUT)                       01600240
LINE   25   C           WROW    STORAGE FOR FREQUENCY TERMS FOR ONE RECEIVING ELEMENT 01600250
LINE   26   C          LRECL  LENGTH OF WROW EQUAL TO NTERM*NET                       01600260
LINE   27   C           ERROR  LOGICAL SET TO TRUE IF ERROR IS DETECTED               01600270
LINE   28         COMPLEX  WTEROW(LRWTE)                                             01600280
LINE   29         COMPLEX WTES                                                       01600290
LINE   30         REAL MACH                                                          01600300
LINE   31         INTEGER TAPE8                                                      01600310
LINE   32         LOGICAL BKWSP                                                      01600320
LINE   33         LOGICAL ERROR                                                      01600330
LINE   34         LOGICAL TREDGE                                                     01600340
LINE   35         LOGICAL WAKE,WAKE1,WAKENZ                                          01600350
LINE   36         LOGICAL WAKE2                                                      01600360
LINE   37         DIMENSION  ISONS(12,1),                TRS(4,3,1), NSP(3,1)      01600370
LINE   38         DIMENSION  NNCH(1), SYM(1)                                         01600380
LINE   39         DIMENSION  NSECT(1), NE(3,1), ZSECT(3,1), XCEN(1), XYZ(1), AREA(1)01600390
LINE   40         DIMENSION WFSV(20)                                                 01600400
LINE   41         DIMENSION WROW(LRECL)                                              01600410
LINE   42         COMMON/BASIC/MACH                                                  01600420
LINE   43         COMMON / FQ1 / NFREQ, CF(12,30), FREQ(12), FREQP(12), FRTEST       01600430
LINE   44         COMMON / RRLL / TVW(4), YRO, YLO, ZR, ZRZR, ZL, ZLZL, IRC, IIN     01600440
LINE   45         COMMON  /TAPE/ I9,I10,I11,I12,I13,I14,J9,I15                       01600450
LINE   46         COMMON/WAKEUP/ WTES(12), TREDGE,WAKE1,WAKE, WAKENZ, KWAKE          01600460
LINE   47         COMMON / WW1 / XO,YO,ZD,ZDZD, SYMK, NINSID                         01600470
LINE   48   C     ------------------------------------------------------------------01600480
LINE   49   C           THE FREQUENCY-INDEPENDENT TERMS FOR ALL INFLUENCING ELEMENTS01600490
LINE   50   C          OF A GIVEN RECEIVING ELEMENT ARE STORED IN WROW               01600500
LINE   51   C          COMPUTE 1 ROW FOR EVERY ELEMENT  (CALLED RECEIVING ELEMENT)  01600510
LINE   52   C          NTERMS IS THE NO. TERMS USED TO COMPUTE AN ELEMENT OF W       01600520
LINE   53   C           INDXR  INDEX INTO XYZ FOR RECEIVING ELEMENT                  01600530
LINE   54   C           INDXI  INDEX INTO XYZ FOR INFLUENCING ELEMENT                01600540
LINE   55   C           IRC RECEIVING ELEMENT COUNTER                               01600550
LINE   56   C           IIN INFLUENCING ELEMENT COUNTER                             01600560
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LINE   57  C          K1 IS COUNTER FOR RECEIVING SECTION, K2 FOR INFLUENCING SECT.01600570
LINE   58        IF(IWTE.NE.0)  REWIND I15                                       01600580
LINE   59        REWIND TAPE8                                                    01600590
LINE   60  C                                                                     01600600
LINE   61        WRITE                                                           01600610
LINE   62       1  (TAPE8)  MACH,NET,REFLEN,IWTE, NFREQ, (FREQ(I),I=1,NFREQ)    01600620
LINE   63        IF(IWTE.NE.0)                                                   01600630
LINE   64       1WRITE(I15) MACH,NET,REFLEN,IWTE, NFREQ, (FREQ(I), I=1,NFREQ)    01600640
LINE   65  C                                                                     01600650
LINE   66        WAKE = .FALSE.                                                  01600660
LINE   67        INDXR = 1                                                       01600670
LINE   68        IRC = 0                                                         01600680
LINE   69        K1 = 0                                                          01600690
LINE   70        KW = 0                                                          01600700
LINE   71        KWAKE = 0                                                       01600710
LINE   72  C     ----------------------------------------------------------------01600720
LINE   73  C     ICOL = 1                                                        01600730
LINE   74  C     ----------------------------------------------------------------01600740
LINE   75  C          LOOP ON RECEIVING ELEMENTS BY WING J AND SECTION I OF WING J 01600750
LINE   76  C                                                                     01600760
LINE   77  C                                                                     01600770
LINE   78        DO 100  J=1,NWING                                               01600780
LINE   79        NSR = NSECT(J)                                                  01600790
LINE   80        SYMK = SYM(J)                                                   01600800
LINE   81        DO 95 I=1,NSR                                                   01600810
LINE   82  C                                                                     01600820
LINE   83        K1 = K1 & 1                                                     01600830
LINE   84        NER = NE(I,J)                                                   01600840
LINE   85  C          ZSECT(I,J) 'Z COORDINATE OF SECTION I,WING J               01600850
LINE   86        ZCR = ZSECT(I,J)                                                01600860
LINE   87  C          LOOP ON THE NUMBER OF ELEMENTS IN SECT. I OF WING J (RECIEV.)01600870
LINE   88  C                                                                     01600880
LINE   89        DO 90  IER=1,NER                                                01600890
LINE   90  C                                                                     01600900
LINE   91        WAKE2 = .FALSE.                                                 01600910
LINE   92        IRC = IRC.& 1                                                   01600920
LINE   93  C          FIND CENTER PT.(XO,YCR,ZCR) IN RECEIVING SECTION SYSTEM    01600930
LINE   94        XO = XCEN(IRC)                                                  01600940
LINE   95        YCR = .50*(XYZ(INDXR&4)&XYZ(INDXR&5))                           01600950
LINE   96        DSX = 0.5*(XYZ(INDXR&5)-XYZ(INDXR&4))                           01600960
LINE   97        AREA(IRC)=DSX*(XYZ(INDXR&3)-XYZ(INDXR) &XYZ(INDXR&2)-XYZ(INDXR&1))01600970
LINE   98  C              ZCR IS CONSTANT FOR ALL ELEMENTS IN SECTION I OF WING J 01600980
LINE   99        INDXR = INDXR & 6                                               01600990
LINE  100  C                                                                     01601000
LINE  101        IF( IWTE .EQ. 0 ) GO TO 50                                      01601010
LINE  102        DO 45 IEI=1,LRWTE                                               01601020
LINE  103     45 WTEROW(IEI) = (0.0, 0.0)                                        01601030
LINE  104     50 CONTINUE                                                        01601040
LINE  105  C                                                                     01601050
LINE  106  C                                                                     01601060
LINE  107  C          FIND DIAGONAL ELEMENT                                      01601070
LINE  108        CALL RTOI ( TRS(1,I,J), TRS(1,I,J), YCR, ZCR, ZRO, ZLO )        01601080
LINE  109        ZR = ZRO - ZCR                                                  01601090
LINE  110        ZL = ZLO & ZCR                                                  01601100
LINE  111        ZRZR = ZR*ZR                                                    01601110
LINE  112        ZLZL = ZL*ZL                                                    01601120
LINE  113        TREDGE = .FALSE.                                                01601130
LINE  114        NINSID = 0                                                      01601140
LINE  115        IIN = IRC                                                       01601150
LINE  116        INDXI = 6*IRC - 5                                               01601160
LINE  117        ICOL = NFREQ*(IRC-1) & 1                                        01601170
LINE  118  C                                                                     01601180
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LINE 119        CALL WINTGR( XYZ(INDXI), XYZ(INDXI&4), WROW(ICOL) )                    01601190
LINE 120  C                                                                            01601200
LINE 121        WII = WROW(ICOL)                                                       01601210
LINE 122  C                                                                            01601220
LINE 123  C                                                                            01601230
LINE 124  C                                                                            01601240
LINE 125  C          SET UP CONSTANTS FOR INFLUENCING ELEMENTS                         01601250
LINE 126  C                                                                            01601260
LINE 127        INDXI = 1                                                              01601270
LINE 128        IIN = 1                                                                01601280
LINE 129        NSPI = 0                                                               01601290
LINE 130        K2 = 0                                                                 01601300
LINE 131  C     ---------------------------------------------------------------------- 01601310
LINE 132        ICOL = 1                                                               01601320
LINE 133  C     ---------------------------------------------------------------------- 01601330
LINE 134  C                                                                            01601340
LINE 135  C          LOOP ON INFLU. ELEMENT BY WING JJ, SECTION II  (DO 85, DO 80)     01601350
LINE 136  C                                                                            01601360
LINE 137        DO 85 JJ = 1,NWING                                                     01601370
LINE 138        SYMK = SYM(JJ)                                                         01601380
LINE 139        NSI = NSECT(JJ)                                                        01601390
LINE 140        DO 80 II=1,NSI                                                         01601400
LINE 141  C                                                                            01601410
LINE 142  C          NEI  NO. ELEMENTS IN SECTION II OF WING JJ                        01601420
LINE 143        NEI = NE(II,JJ)                                                        01601430
LINE 144        NSPS = NSP(II,JJ)                                                      01601440
LINE 145        K2 = K2 & 1                                                            01601450
LINE 146  C         CHECK IF SECTION K2 HAS ZERO INFLUENCE ON SECTION K1               01601460
LINE 147        IF( ISONS(K1,K2) .NE. 0 ) GO TO 60                                     01601470
LINE 148  C                                                                            01601480
LINE 149  C          SECT. K2  HAS ZERO INFLUENCE ON SECT. K1                          01601490
LINE 150  C                                                                            01601500
LINE 151        NTNEI = NEI*NFREQ                                                      01601510
LINE 152        DO 55  IEI=1,NTNEI                                                     01601520
LINE 153        WROW(ICOL) = 0.0                                                       01601530
LINE 154        ICOL = ICOL & 1                                                        01601540
LINE 155     55 CONTINUE                                                               01601550
LINE 156        INDXI = INDXI & 6*NEI                                                  01601560
LINE 157        IIN = IIN & NEI                                                        01601570
LINE 158        NSPI = NSPI & NSPS                                                     01601580
LINE 159  C          LOOP TO NEXT INFLUENCING SECTION II                               01601590
LINE 160        GO TO 80                                                               01601600
LINE 161  C                                                                            01601610
LINE 162    60  CONTINUE                                                              01601620
LINE 163  C          SECTION IS ASSUMED TO HAVE SOME ELEMENTS WITH NON-ZERO INFLU-     01601630
LINE 164  C          ENCE. EACH ELEMENT MUST BE CONSIDERED.                            01601640
LINE 165  C                                                                            01601650
LINE 166  C          TRANSFORM CENTER PT. FROM RECEIVING SECTION SYSTEM TO INFLU-      01601660
LINE 167  C          ENCING SECTION SYSTEM.  X IS SAME IN BOTH SYSTEMS.                01601670
LINE 168  C                                                                            01601680
LINE 169        CALL RTOI ( TRS(1,I,J), TRS(1,II,JJ), YCR, ZCR, ZRO, ZLO )             01601690
LINE 170  C                                                                            01601700
LINE 171  C          ZD        DIFFERENCE BETWEEN Z'S  OF INFLU. AND RECEIV. ELEM.   01601710
LINE 172  C          ZDZD IS THE SQUARE OF THE DIFFERENCE OF THE REC AND INFL Z'S     01601720
LINE 173        ZR = ZRO - ZSECT(II,JJ)                                                01601730
LINE 174        ZL = ZLO & ZSECT(II,JJ)                                                01601740
LINE 175        ZRZR = ZR*ZR                                                           01601750
LINE 176        ZLZL = ZL*ZL                                                           01601760
LINE 177  C                                                                            01601770
LINE 178  C          LOOP ON SPANS OF INFLUENCING SECTION II OF WING JJ  DO 75 ISP     01601780
LINE 179  C                                                                            01601790
LINE 180        DO 75 ISP=1,NSPS                                                       01601800
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LINE 181  C                                                                    01601810
LINE 182        NSPI = NSPI & 1                                                01601820
LINE 183        NEPSM1 = NNCH(NSPI) - IIN                                      01601830
LINE 184        NEPS = NEPSM1 & 1                                              01601840
LINE 185  C                                                                    01601850
LINE 186  C            BUMP INDXI AND ICOL TO LAST ELEMENT IN SPAN             01601860
LINE 187        IIN = IIN & NEPS                                               01601870
LINE 188        INDXI = INDXI & 6*NEPSM1                                       01601880
LINE 189        ICOL = ICOL & NFREQ*NEPSM1                                     01601890
LINE 190        BKWSP = .FALSE.                                                01601900
LINE 191        NINSID = 0                                                     01601910
LINE 192        TREDGE = .TRUE.                                                01601920
LINE 193  C                                                                    01601930
LINE 194  C          LOOP ON INFLU. ELEM. OF SPAN ISP FROM BOTTOM UP   DO 70 IEI 01601940
LINE 195  C                                                                    01601950
LINE 196        DO 70 IEI = 1,NEPS                                             01601960
LINE 197  C                                                                    01601970
LINE 198        IIN = IIN - 1                                                  01601980
LINE 199        IF( BKWSP) GO TO 65                                            01601990
LINE 200        WAKE1 = .FALSE.                                                01602000
LINE 201  C                                                                    01602010
LINE 202        CALL WINTGR( XYZ(INDXI), XYZ(INDXI&4), WROW(ICOL) )            01602020
LINE 203  C                                                                    01602030
LINE 204        TREDGE = .FALSE.                                               01602040
LINE 205  C                                                                    01602050
LINE 206        IF( NINSID .EQ. 0 ) GO TO 69                                   01602060
LINE 207  C                                                                    01602070
LINE 208        IF( .NOT. WAKE1 ) GO TO 58                                     01602080
LINE 209        WAKE = .TRUE.                                                  01602090
LINE 210        WAKE2 = .TRUE.                                                 01602100
LINE 211        INDWK = NFREQ*(NSPI-1)                                         01602110
LINE 212        DO 56 IW=1,NFREQ                                               01602120
LINE 213        INDWK = INDWK & 1                                              01602130
LINE 214        WTEROW(INDWK) = WTES(IW)                                       01602140
LINE 215     56 CONTINUE                                                       01602150
LINE 216     58 CONTINUE                                                       01602160
LINE 217  C                                                                    01602170
LINE 218        IF( NINSID .EQ. 1 ) GO TO 69                                   01602180
LINE 219        RD = ABS( WROW(ICOL) / WII )                                   01602190
LINE 220        IF( RD .GT. PERC ) GO TO 62                                    01602200
LINE 221        BKWSP = .TRUE.                                                 01602210
LINE 222        IJ = ICOL - 1                                                  01602220
LINE 223        DO 68 IF=1,NFREQ                                               01602230
LINE 224        IJ = IJ & 1                                                    01602240
LINE 225        WROW(IJ) = 0.0                                                 01602250
LINE 226     68 WFSV(IF) = 0.0                                                 01602260
LINE 227     62 CONTINUE                                                       01602270
LINE 228        IF( NINSID .LE. 2 ) GO TO 69                                   01602280
LINE 229        IJ = ICOL & NFREQ - 1                                          01602290
LINE 230        IF( NINSID .GT. 3 ) GO TO 63                                   01602300
LINE 231  C                                                                    01602310
LINE 232     61 CONTINUE                                                       01602320
LINE 233        TESTW = WROW(IJ)                                               01602330
LINE 234        GO TO 69                                                       01602340
LINE 235  C                                                                    01602350
LINE 236     63 CONTINUE                                                       01602360
LINE 237        TEST = TESTW - WROW(IJ)                                        01602370
LINE 238        IF( WROW(IJ) .NE. 0.0 ) TEST = TEST/WROW(IJ)                   01602380
LINE 239        IF( ABS(TEST) .GT. .02 )  GO TO 61                             01602390
LINE 240        BKWSP = .TRUE.                                                 01602400
LINE 241        IJ = ICOL -1                                                   01602410
LINE 242        DO  64  IF=1,NFREQ                                             01602420
```

```
LINE 243          IJ = IJ & 1                                                  01602430
LINE 244       64 WFSV(IF) = WROW(IJ)                                          01602440
LINE 245          GO TO 69                                                     01602450
LINE 246  C                                                                    01602460
LINE 247       65 CONTINUE                                                     01602470
LINE 248          IJ = ICOL - 1                                                01602480
LINE 249          DO 67 IF=1,NFREQ                                             01602490
LINE 250          IJ = IJ & 1                                                  01602500
LINE 251       67 WROW(IJ) = WFSV(IF)                                          01602510
LINE 252  C                                                                    01602520
LINE 253       69 CONTINUE                                                     01602530
LINE 254          ICOL = ICOL - NFREQ                                          01602540
LINE 255          INDXI = INDXI - 6                                            01602550
LINE 256  C                                                                    01602560
LINE 257  C            END LOOP ON ELEMENTS IN THE INFLUENCING SPAN             01602570
LINE 258       70 CONTINUE                                                     01602580
LINE 259  C                                                                    01602590
LINE 260          IIN = IIN & NEPS                                             01602600
LINE 261          INDXI = INDXI & 6*NEPS & 6                                   01602610
LINE 262          ICOL = ICOL & NFREQ*NEPS & NFREQ                             01602620
LINE 263  C                                                                    01602630
LINE 264  C            END LOOP ON INFLUENCING SPANS OF SECTION II OF WING JJ    01602640
LINE 265       75 CONTINUE                                                     01602650
LINE 266  C                                                                    01602660
LINE 267  C            END LOOP ON INFLUENCING SECTION II OF WING JJ             01602670
LINE 268       80 CONTINUE                                                     01602680
LINE 269  C                                                                    01602690
LINE 270  C            END LOOP ON INFLUENCING WING JJ                          01602700
LINE 271       85 CONTINUE                                                     01602710
LINE 272  C                                                                    01602720
LINE 273  C            WROW 1 ROW HAS BEEN COMPUTED FOR A GIVEN RECEIVING ELEMENT. 01602730
LINE 274  C            WRITE WROW ON FILE AND LOOP TO NEXT RECEIVING ELEMENT    01602740
LINE 275  C      ------------------------------------------------------------- 01602750
LINE 276          WRITE(TAPE8) IRC,WROW                                        01602760
LINE 277  C       ZERO FOR WAKE ELEMENTS                                       01602770
LINE 278  C       WAKE = FALSE  -  NO WAKE ELEMENTS FOR ANY ELEMENT            01602780
LINE 279  C       WAKE1= TRWE   -  ELEMENT IS WAKED                            01602790
LINE 280          IF (IWTE .EQ.0) GO TO 90                                     01602800
LINE 281          IF( .NOT. WAKE2 ) GO TO 90                                   01602810
LINE 282          WRITE( I15 ) IRC,WTEROW                                      01602820
LINE 283          KWAKE = IRC                                                  01602830
LINE 284          KW = KW & 1                                                  01602840
LINE 285  C       IF(IWTE.NE.0)WRITE(6,3001)IRC,IER,I,J, WTEROW                01602850
LINE 286  C       ------------------------------------------------------------ 01602860
LINE 287  C       WRITE( I6, 3001 ) IRC, IER, I, J,(WROW(IJ), IJ=IJ1,ICOL )    01602870
LINE 288  C       ICOL = ICOL & 1                                              01602880
LINE 289  C                                                                    01602890
LINE 290  C       WRITE( I6,3001 ) IRC, IER, I, J,  WRCW                       01602900
LINE 291  C                                                                    01602910
LINE 292  C            END LOOP ON RECEIVING ELEMENT IN SECTION I OF WING J     01602920
LINE 293       90 CONTINUE                                                     01602930
LINE 294  C                                                                    01602940
LINE 295  C            END LOOP ON RECEIVING SECTION I OF WING J                01602950
LINE 296       95 CONTINUE                                                     01602960
LINE 297  C                                                                    01602970
LINE 298  C            END LOOP ON RECEIVING WING J                            01602980
LINE 299      100 CONTINUE                                                     01602990
LINE 300  C                                                                    01603000
LINE 301  C       ------------------------------------------------------------ 01603010
LINE 302      110 CONTINUE                                                     01603020
LINE 303  C                                                                    01603030
LINE 304  C                                                                    01603040
```

```
LINE 305          IF(WAKE)    END FILE I15                                          01603050
LINE 306          I6 =6                                                             01603060
LINE 307          IF(.NOT. WAKE) WRITE(I6,1000)                                     01603070
LINE 308          IF(WAKE )      WRITE (I6,1010)  KW                                01603080
LINE 309     1000 FORMAT(1HO///16X,37HNO WAKE EFFECTS HAVE BEEN DETERMINED  )       01603090
LINE 310     1010 FORMAT(1HO///16X,38HWAKE EFFECTS HAVE BEEN DETERMINED FOR  ,I14,  01603100
LINE 311         1 9H ELEMENTS )                                                   01603110
LINE 312          END FILE TAPE8                                                    01603120
LINE 313          RETURN                                                            01603130
LINE 314    C3001 FORMAT(/// 18H RECEIVING ELEMENT, I5, 5X, 6HNUMBER, I4, 5X,      01603140
LINE 315    C     1 10HOF SECTION, I2, 5X, 7HOF WING,I2 // (1X, 10E13.4 )  )       01603150
LINE 316          END                                                               01603160
```

DISPLAY...FILE DECK 17

```
LINE    1        SUBROUTINE MESH(CORNX,CORNY,CORNZ, XYZ, Z, TRS, NNCH, SW, XLE,     01700010
LINE    2       1                NSP, NE, NETSV, EARO )                             01700020
LINE    3  C                                                                        01700030
LINE    4  C     PURPOSE   GENERATE MESH FOR 1 SECTION WWITHOUT CONTROL LINES       01700040
LINE    5  C                                                                        01700050
LINE    6  C      INPUT                                                             01700060
LINE    7  C                                                                        01700070
LINE    8  C          CORNX,CORNY, CORNZ   X,Y, AND Z COORD. OF CORNER PTS 1,2,3,4 01700080
LINE    9  C                               IN GLOBAL SYSTEM                       01700090
LINE   10  C          NSP     DESIRED NUMBER OF SPANS FOR SECTION (INPUT BY USER) 01700100
LINE   11  C          EARO    ELEMENT ASPECT RATIO                                01700110
LINE   12  C                                                                        01700120
LINE   13  C      OUTPUT                                                            01700130
LINE   14  C                                                                        01700140
LINE   15  C          XYZ     4 X AND 2 Y LOCAL COORD. FOR EACH ELEMENT OF SECTION 01700150
LINE   16  C          Z       Z COORDINATE FOR ALL ELEMENTS IN SECTION (FROM TRANS) 01700160
LINE   17  C          TRS     2 BY 2 TRANS MATRIX TO GO FROM LOCAL TO GLOBAL       01700170
LINE   18  C          NNCH    ELEMENT NUMBER (W.R.T. TOTAL STRUCTURE) OF LAST      01700180
LINE   19  C                  ELEMENT IN SPAN. (USED FOR LABELING PLOT)            01700190
LINE   20  C          SW      SPAN WIDTH                                          01700200
LINE   21  C          XLE     AVERAGE X COORDINATE OF LEADING EDGE PER SPAN       01700210
LINE   22  C          NE      NUMBER OF ELEMENTS IN SECTION.                      01700220
LINE   23  C          NETSV   COUNTER OF TOTAL NUMBER OF ELEMENTS IN STRUCTURE     01700230
LINE   24  C                                                                        01700240
LINE   25        DIMENSION CORNX(1), CORNY(1), CORNZ(1), TRS(1), X(4), Y(4)         01700250
LINE   26        DIMENSION XLE(1), SW(1)                                            01700260
LINE   27        DIMENSION                    XYZ(1),NNCH(20)                       01700270
LINE   28        COMMON/BASIC/MACH,BEETA                                            01700280
LINE   29        EQUIVALENCE (X(1), X1), (X(2),X2), (X(3),X3), (X(4),X4)            01700290
LINE   30        EQUIVALENCE (Y(1), Y1), (Y(2),Y2), (Y(3),Y3), (Y(4),Y4)            01700300
LINE   31        DATA DTEST  /.98  /                                                01700310
LINE   32  C                                                                        01700320
LINE   33  C          NOTE THAT ELEMENT IS NUMBERED CLOCKWISE WHILE SECT IS COUNTER 01700330
LINE   34  C                                                                        01700340
LINE   35  C          DX34   DISTANCE BETWEEN POINTS THREE AND FOUR                 01700350
LINE   36  C          DX12  DISTANCE BETWEEN POINTS 1 AND 2                         01700360
LINE   37  C          DS      Y INCREMENT BETWEEN SPANS, (SPAN LENGTH)            01700370
LINE   38  C          NC1,NC2 NUMBER OF CORD DIVISIONS IN AREA 1 AND 2             01700380
LINE   39  C          DC1   CHORD LENGTH                                          01700390
LINE   40  C          DS      Y INCREMENT BETWEEN SPANS, (SPAN LENGTH)            01700400
LINE   41  C          DXLE     X INCREMENT A LONG LEADING EDGE                    01700410
LINE   42  C          DXTE     X INCREMENT ALONG TRAILING EDGE                    01700420
LINE   43  C                                                                        01700430
LINE   44  C          TRANSFORM CORNER POINTS TO LOCAL SYSTEM, WORK IN LOCAL SYSTEM01700440
LINE   45  C                                                                        01700450
LINE   46        CALL TRANS( CORNX, CORNY, CORNZ, TRS, X, Y, Z )                    01700460
LINE   47  C                                                                        01700470
LINE   48  C          FIND CRATIO  (CHORD TO SPAN RATIO)                            01700480
LINE   49  C                                                                        01700490
LINE   50        DC = Y3 - Y1                                                       01700500
LINE   51        DS = (X3 - X1)*BEETA                                               01700510
LINE   52        CRATIO = ( EARO*SQRT( DS*DS & DC*DC) ) / (DC*BEETA)                01700520
LINE   53  C                                                                        01700530
LINE   54  C     ASSUME CONSTANT SLOPE FOR ALL LINES                                01700540
LINE   55  C                                                                        01700550
LINE   56        DX34 = X4 - X3                                                     01700560
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LINE   57          DX12 = X2 - X1                                                    01700570
LINE   58          DS = (Y3-Y1)/NSP                                                  01700580
LINE   59          DC = CRATIO*DS                                                    01700590
LINE   60          DXLE = (X3-X1)/NSP                                                01700600
LINE   61          DXTE = (X4-X2)/NSP                                                01700610
LINE   62  C                                                                         01700620
LINE   63  C            COMPUTE  NC1, DC1  FOR AREA 1                                01700630
LINE   64  C                                                                         01700640
LINE   65          NC1=1                                                             01700650
LINE   66          DC1 = AMAX1(DX12, DX34 )                                          01700660
LINE   67          IF( DC1 .LT. DC ) GO TO 11                                        01700670
LINE   68          NC1 = DC1/DC                                                      01700680
LINE   69          DC1 = DC1/NC1                                                     01700690
LINE   70    11    CONTINUE                                                          01700700
LINE   71  C                                                                         01700710
LINE   72  C                                                                         01700720
LINE   73  C     ---------------------------------------------------------------------01700730
LINE   74  C                                                                         01700740
LINE   75          NE=0                                                              01700750
LINE   76  C                                                                         01700760
LINE   77  C            LOOP ON SPANS                                                01700770
LINE   78          DO  100  I=1,NSP                                                  01700780
LINE   79  C                                                                         01700790
LINE   80  C            FIND THE Y COORD. FOR THIS SPAN  (AY AND BY )                01700800
LINE   81          BY = Y1 & I*DS                                                    01700810
LINE   82          AY = BY - DS                                                      01700820
LINE   83  C            FIND AX,BX, X COORD ON LEADING EDGE ON BOTH SIDES OF SPAN    01700830
LINE   84          BX = X1 & I*DXLE                                                  01700840
LINE   85          AX = BX - DXLE                                                    01700850
LINE   86          SW(I) = DS                                                        01700860
LINE   87          XLE(I) = 0.5*(AX&BX)                                              01700870
LINE   88  C            FIND CX,DX THE X COOR ON TRAILING EDGE                       01700880
LINE   89          CX = X2 & I*DXTE                                                  01700890
LINE   90          DX = CX - DXTE                                                    01700900
LINE   91  C                                                                         01700910
LINE   92          DXM = DTEST*DC1                                                   01700920
LINE   93          CXM = CX - DXM                                                    01700930
LINE   94          DXM = DX - DXM                                                    01700940
LINE   95  C                                                                         01700950
LINE   96  C            LOOP ON NC1 FOR AREA 1                                       01700960
LINE   97          DO 20  J1 = 1,NC1                                                 01700970
LINE   98  C                                                                         01700980
LINE   99          NJ = 6*NE                                                         01700990
LINE  100          NE=NE&1                                                           01701000
LINE  101          XYZ(NJ&5)=AY                                                      01701010
LINE  102          XYZ(NJ&6)=BY                                                      01701020
LINE  103          XD = J1*DC1                                                       01701030
LINE  104          XC = BX & XD                                                      01701040
LINE  105          XD = AX & XD                                                      01701050
LINE  106          XA = XD - DC1                                                     01701060
LINE  107          XB = XC - DC1                                                     01701070
LINE  108          XYZ(NJ&1)=XA                                                      01701080
LINE  109          XYZ(NJ&2)=XB                                                      01701090
LINE  110          XYZ(NJ&3)=XC                                                      01701100
LINE  111          XYZ(NJ&4)=XD                                                      01701110
LINE  112  C            CHECK TO SEE IF WE HAVE REACHED TRAILING EDGE (CX AND DX )   01701120
LINE  113          IF( XC .GT. CX  .OR.  XD .GT. DX ) GO TO 19                       01701130
LINE  114          GO TO 20                                                          01701140
LINE  115    19    CONTINUE                                                          01701150
LINE  116          XYZ(NJ&3)=CX                                                      01701160
LINE  117          XYZ(NJ&4)=DX                                                      01701170
LINE  118          GO TO 60                                                          01701180
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LINE 119     20  CONTINUE                                                    01701190
LINE 120  C                                                                 01701200
LINE 121     60  CONTINUE                                                   01701210
LINE 122         NNCH(I) = NE & NETSV                                       01701220
LINE 123  C                                                                 01701230
LINE 124     100 CONTINUE                                                   01701240
LINE 125  C                                                                 01701250
LINE 126  C           UPDATE COUNTER OF TOTAL ELEMENTS FOR STRUCTURE        01701260
LINE 127         NETSV = NETSV & NE                                         01701270
LINE 128         RETURN                                                     01701280
LINE 129         END                                                        01701290
```

DISPLAY...FILE DECK 18

```
LINE    1        SUBROUTINE MESHCL(CORNX,CORNY,CORNZ,XYZ,Z,TRS,NNCH,SW,XLE,          01800010
LINE    2       1            , NSP, NE, NETSV, ICL, CL, EARO )                      01800020
LINE    3   C                                                                       01800030
LINE    4   C     PURPOSE   GENERATE MESH FOR 1 SECTION WITH CONTROL LINES          01800040
LINE    5   C                                                                       01800050
LINE    6   C      INPUT                                                            01800060
LINE    7   C                                                                       01800070
LINE    8   C          CORNX,CORNY, CORNZ   X,Y, AND Z COORD. OF CORNER PTS 1,2,3,4 01800080
LINE    9   C                               IN GLOBAL SYSTEM                        01800090
LINE   10   C          NSP     DESIRED NUMBER OF SPANS FOR SECTION (INPUT BY USER)  01800100
LINE   11   C          ICL     NUMBER OF CONTROL LINES IN SECTION ( 1OR2 )          01800110
LINE   12   C          CL(1),CL(2)  X COORD. OF FIRST CONTROL LINE                  01800120
LINE   13   C          CL(3),CL(4)   X COORD. OF SECOND CONTROL LINE                01800130
LINE   14   C          EARO    ELEMENT ASPECT RATIO                                01800140
LINE   15   C                                                                       01800150
LINE   16   C      OUTPUT                                                           01800160
LINE   17   C                                                                       01800170
LINE   18   C          XYZ     4 X AND 2 Y LOCAL COORD. FOR EACH ELEMENT OF SECTION 01800180
LINE   19   C          Z       Z COORDINATE FOR ALL ELEMENTS IN SECTION (FROM TRANS) 01800190
LINE   20   C          TRS     2 BY 2 TRANS MATRIX TO GO FROM LOCAL TO GLOBAL       01800200
LINE   21   C          NNCH    ELEMENT NUMBER (W.R.T. TOTAL STRUCTURE) OF LAST      01800210
LINE   22   C                  ELEMENT IN SPAN. (USED FOR LABELING PLOT)            01800220
LINE   23   C          SW      SPAN WIDTH                                           01800230
LINE   24   C          XLE     AVERAGE X COORDINATE OF LEADING EDGE PER SPAN        01800240
LINE   25   C          NE      NUMBER OF ELEMENTS IN SECTION.                       01800250
LINE   26   C          NETSV   COUNTER OF TOTAL NUMBER OF ELEMENTS IN STRUCTURE      01800260
LINE   27   C                                                                       01800270
LINE   28        DIMENSION CL(1)                                                    01800280
LINE   29        DIMENSION CORNX(1), CORNY(1), CORNZ(1), TRS(1), X(4), Y(4)         01800290
LINE   30        DIMENSION XLE(1), SW(1)                                            01800300
LINE   31        DIMENSION                  XYZ(1),NNCH(20)                         01800310
LINE   32        COMMON/BASIC/MACH,BEETA                                            01800320
LINE   33        EQUIVALENCE (X(1), X1), (X(2),X2), (X(3),X3), (X(4),X4)            01800330
LINE   34        EQUIVALENCE (Y(1), Y1), (Y(2),Y2), (Y(3),Y3), (Y(4),Y4)            01800340
LINE   35        DATA DTEST  /.98  /                                                01800350
LINE   36   C                                                                       01800360
LINE   37   C          SECTION IS DIVIDED INTO 3 AREAS                              01800370
LINE   38   C          AREA 1  BETWEEN LEADING EDGE AND 1ST CONTROL LINE            01800380
LINE   39   C          AREA 2  BETWEEN FIRST AND 2ND CONTROL LINES                  01800390
LINE   40   C          AREA 3  BETWEEN CONTROL LINE AND TRAILING EDGE               01800400
LINE   41   C          AREA 2 DOES NOT EXIST IF THERE IS ONLY ONE CONTROL LINE      01800410
LINE   42   C          NOTE THAT ELEMENT IS NUMBERED CLOCKWISE WHILE SECT IS COUNTER01800420
LINE   43   C                                                                       01800430
LINE   44   C          DXLE     X INCREMENT A LONG LEADING EDGE                    01800440
LINE   45   C          DXTE     X INCREMENT ALONG TRAILING EDGE                    01800450
LINE   46   C          DXC1     X INCREMENT ALONG FIRST CONTROL LINE (LEADING C.LINE)01800460
LINE   47   C          DXC2     X INCREMENT ALONG SECOND CONTROL LINE IF IT EXISTS  01800470
LINE   48   C          DC1,2,3 CHORD LENGTH IN AREAS 1, 2, AND 3                    01800480
LINE   49   C          NC1,2,3 NUMBER OF CORD DIVISIONS IN AREA 1, 2, AND 3         01800490
LINE   50   C          DX34   DISTANCE BETWEEN POINTS THREE AND FOUR                01800500
LINE   51   C          DX22   DISTANCE BETWEEN 1 AND 2  MINUS DX34                  01800510
LINE   52   C                                                                       01800520
LINE   53   C                                                                       01800530
LINE   54   C          TRANSFORM CORNER POINTS TO LOCAL SYSTEM, WORK IN LOCAL SYSTEM01800540
LINE   55   C                                                                       01800550
LINE   56        CALL TRANSI( CORNX, CORNY, CORNZ, TRS, X, Y, Z )                   01800560
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LINE  57  C                                                                    01800570
LINE  58  C          FIND CRATIO  (CHORD TO SPAN RATIO)                        01800580
LINE  59  C                                                                    01800590
LINE  60          DC = Y3 - Y1                                                 01800600
LINE  61          DS = (X3 - X1)*BEETA                                         01800610
LINE  62          CRATIO = ( EARO*SQRT( DS*DS & DC*DC) ) / (DC*BEETA)          01800620
LINE  63  C                                                                    01800630
LINE  64  C       ASSUME CONSTANT SLOPE FOR ALL LINES                          01800640
LINE  65  C                                                                    01800650
LINE  66          DX34 = X4 - X3                                               01800660
LINE  67          DX22 = X2 - X1 - DX34                                        01800670
LINE  68          DS = (Y3-Y1)/NSP                                             01800680
LINE  69          DC = CRATIO*DS                                               01800690
LINE  70          DXLE = (X3-X1)/NSP                                           01800700
LINE  71          DXTE = (X4-X2)/NSP                                           01800710
LINE  72  C                                                                    01800720
LINE  73  C          FIND INFORMATION FOR AREA BETWEEN LEADING EDGE AND 1ST C.LINE01800730
LINE  74  C                                                                    01800740
LINE  75          CL1 = CL(1)                                                  01800750
LINE  76          CL2 = CL(2)                                                  01800760
LINE  77          DXC1 = (CL2-CL1)/NSP                                         01800770
LINE  78          NC1 = 1                                                      01800780
LINE  79          DC1= AMAX1( CL1-X1,CL2-X3 )                                  01800790
LINE  80          IF( DC1 .LT. DC ) GO TO 11                                   01800800
LINE  81          NC1 = DC1/DC                                                 01800810
LINE  82          DC1 = DC1/NC1                                                01800820
LINE  83    11    CONTINUE                                                     01800830
LINE  84  C                                                                    01800840
LINE  85  C          FIND INFO FOR AREA BETWEEN CONTROL LINES                  01800850
LINE  86  C                                                                    01800860
LINE  87          NC2 = 0                                                      01800870
LINE  88          IF( ICL .EQ. 1 ) GO TO 14                                    01800880
LINE  89  C                                                                    01800890
LINE  90          CL3 = CL(3)                                                  01800900
LINE  91          CL4 = CL(4)                                                  01800910
LINE  92          DXC2 = (CL4-CL3)/NSP                                         01800920
LINE  93  C          FIND DC3 FOR AREA BETWEEN SECOND CONTROL LINE AND TRAILINGEDGE01800930
LINE  94          DC3= AMAX1( X2-CL3, X4-CL4 )                                 01800940
LINE  95          NC2 = 1                                                      01800950
LINE  96          DC2= AMAX1( CL3-CL1, CL4-CL2 )                               01800960
LINE  97          IF( DC2 .LT. DC ) GO TO 16                                   01800970
LINE  98          NC2 = DC2/DC                                                 01800980
LINE  99          DC2 = DC2/NC2                                                01800990
LINE 100          GO TO 16                                                     01801000
LINE 101  C                                                                    01801010
LINE 102  C                                                                    01801020
LINE 103    14    CONTINUE                                                     01801030
LINE 104  C          FIND DC3 FOR AREA BETWEEN FIRST CONTROL LINE AND TRAILING EDGE01801040
LINE 105          DC3= AMAX1( X2-CL1, X4-CL2 )                                 01801050
LINE 106  C                                                                    01801060
LINE 107      16  CONTINUE                                                     01801070
LINE 108  C                                                                    01801080
LINE 109          NC3 = 1                                                      01801090
LINE 110          IF( DC3 .LT. DC ) GO TO 18                                   01801100
LINE 111          NC3 = DC3/DC                                                 01801110
LINE 112          DC3 = DC3/NC3                                                01801120
LINE 113    18    CONTINUE                                                     01801130
LINE 114  C                                                                    01801140
LINE 115  C     ---------------------------------------------------------------01801150
LINE 116  C                                                                    01801160
LINE 117  C          LOOP ON SPANS                                             01801170
LINE 118          NE = 0                                                       01801180
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LINE 119  C                                                                    01801190
LINE 120        DO  100  I=1,NSP                                               01801200
LINE 121  C                                                                    01801210
LINE 122  C           FIND THE Y COORD. FOR THIS SPAN  (AY AND BY )             01801220
LINE 123        BY = Y1 & I*DS                                                 01801230
LINE 124        AY = BY - DS                                                   01801240
LINE 125  C           FIND AX,BX, X COORD ON LEADING EDGE ON BOTH SIDES OF SPAN 01801250
LINE 126        BX = X1 & I*DXLE                                               01801260
LINE 127        AX = BX - DXLE                                                 01801270
LINE 128        SW(I) = DS                                                     01801280
LINE 129        XLE(I) = 0.5*(AX&BX)                                           01801290
LINE 130  C           FIND CX,DX THE X COOR ON TRAILING EDGE                   01801300
LINE 131        CX = X2 & I*DXTE                                               01801310
LINE 132        DX = CX - DXTE                                                 01801320
LINE 133  C           FIND  ACL1, BCL1 X COORD ON FIRST CONTROL LINE           01801330
LINE 134        BCL1 = CL1 & I*DXC1                                            01801340
LINE 135        ACL1 = BCL1 - DXC1                                             01801350
LINE 136  C                                                                    01801360
LINE 137        TD1 = DTEST*DC1                                                01801370
LINE 138        TC1 = BCL1 - TD1                                               01801380
LINE 139        TD1 = ACL1 - TD1                                               01801390
LINE 140  C                                                                    01801400
LINE 141        DXM = DTEST*DC3                                                01801410
LINE 142        CXM = CX - DXM                                                 01801420
LINE 143        DXM = DX - DXM                                                 01801430
LINE 144  C                                                                    01801440
LINE 145  C           LOOP ON NC1 FOR AREA 1                                   01801450
LINE 146        DO 20  J1 = 1,NC1                                              01801460
LINE 147  C                                                                    01801470
LINE 148        NJ = 6*NE                                                      01801480
LINE 149        NE=NE&1                                                        01801490
LINE 150        XYZ(NJ&5)=AY                                                   01801500
LINE 151        XYZ(NJ&6)=BY                                                   01801510
LINE 152        XD = J1*DC1                                                    01801520
LINE 153        XC = BX & XD                                                   01801530
LINE 154        XD = AX & XD                                                   01801540
LINE 155        XA = XD - DC1                                                  01801550
LINE 156        XB = XC - DC1                                                  01801560
LINE 157        XYZ(NJ&1)=XA                                                   01801570
LINE 158        XYZ(NJ&2)=XB                                                   01801580
LINE 159        XYZ(NJ&3)=XC                                                   01801590
LINE 160        XYZ(NJ&4)=XD                                                   01801600
LINE 161  C           CHECK TO SEE IF WE HAVE REACHED THE FIRST CONTROL LINE   01801610
LINE 162        IF( XC .GT. BCL1  .OR.  XD  .GT. ACL1 ) GO TO 19               01801620
LINE 163        GO TO 20                                                       01801630
LINE 164   19   CONTINUE                                                       01801640
LINE 165        XYZ(NJ&3) = BCL1                                               01801650
LINE 166        XYZ(NJ&4) = ACL1                                               01801660
LINE 167        GO TO 25                                                       01801670
LINE 168  C                                                                    01801680
LINE 169     20 CONTINUE                                                       01801690
LINE 170  C                                                                    01801700
LINE 171     25 CONTINUE                                                       01801710
LINE 172  C                                                                    01801720
LINE 173        IF( ICL .EQ. 1 ) GO TO 40                                      01801730
LINE 174  C                                                                    01801740
LINE 175  C           SECTION FOR AREA 2                                       01801750
LINE 176  C                                                                    01801760
LINE 177  C            FIND  ACL2, BCL2  X COCRD ON SECOND CONTROL LINE        01801770
LINE 178        BCL2 = CL3 & I*DXC2                                            01801780
LINE 179        ACL2 = BCL2 - DXC2                                             01801790
LINE 180  C                                                                    01801800
```

```
LINE 181          TD2 = DTEST*DC2                                          01801810
LINE 182          TC2 = BCL2 - TD2                                         01801820
LINE 183          TD2 = ACL2 - TD2                                         01801830
LINE 184  C                                                                01801840
LINE 185  C            LOOP ON NC2 FOR AREA 2                              01801850
LINE 186          DO 30 J1 = 1,NC2                                         01801860
LINE 187  C                                                                01801870
LINE 188          NJ = 6*NE                                                01801880
LINE 189          NE=NE&1                                                  01801890
LINE 190          XYZ(NJ&5)=AY                                             01801900
LINE 191          XYZ(NJ&6)=BY                                             01801910
LINE 192          XD = J1*DC2                                              01801920
LINE 193          XC = BCL1 & XD                                           01801930
LINE 194          XD = ACL1 & XD                                           01801940
LINE 195          XA = XD - DC2                                            01801950
LINE 196          XB = XC - DC2                                            01801960
LINE 197          XYZ(NJ&1)=XA                                             01801970
LINE 198          XYZ(NJ&2)=XB                                             01801980
LINE 199          XYZ(NJ&3)=XC                                             01801990
LINE 200          XYZ(NJ&4)=XD                                             01802000
LINE 201  C            CHECK TO SEE IF WE HAVE REACHED SECOND CONTROL LINE  01802010
LINE 202          IF( XC .GT. BCL2  .OR.  XD  .GT. ACL2 ) GO TO 29         01802020
LINE 203          GO TO 30                                                 01802030
LINE 204    29    CONTINUE                                                 01802040
LINE 205          XYZ(NJ&3) = BCL2                                         01802050
LINE 206          XYZ(NJ&4) = ACL2                                         01802060
LINE 207          GO TO 45                                                 01802070
LINE 208     30   CONTINUE                                                 01802080
LINE 209          GO TO 45                                                 01802090
LINE 210  C                                                                01802100
LINE 211     40   CONTINUE                                                 01802110
LINE 212  C            THIS SECTION IS REACHED IFF THERE WAS ONLY 1 CONTROL LINE  01802120
LINE 213  C            ACL1,BCL1 ARE PUT INTO ACL2,BCL2 AND AREA 3 IS ALWAYS TREATED01802130
LINE 214  C            AS THE PART BETWEEN 2ON CONTROL  LINE AND LEADING EDGE  01802140
LINE 215          ACL2 = ACL1                                              01802150
LINE 216          BCL2 = BCL1                                              01802160
LINE 217    45    CONTINUE                                                 01802170
LINE 218  C                                                                01802180
LINE 219  C            LOOP ON NC3 FOR AREA 3                              01802190
LINE 220  C                                                                01802200
LINE 221          DO 50 J1=1,NC3                                           01802210
LINE 222  C                                                                01802220
LINE 223          NJ = 6*NE                                                01802230
LINE 224          NE=NE&1                                                  01802240
LINE 225          XYZ(NJ&5)=AY                                             01802250
LINE 226          XYZ(NJ&6)=BY                                             01802260
LINE 227          XYZ(NJ&7)=BY                                             01802270
LINE 228          XYZ(NJ&8)=AY                                             01802280
LINE 229          XD = J1*DC3                                              01802290
LINE 230          XC = BCL2 & XD                                           01802300
LINE 231          XD = ACL2 & XD                                           01802310
LINE 232          XA = XD - DC3                                            01802320
LINE 233          XB = XC - DC3                                            01802330
LINE 234          XYZ(NJ&1)=XA                                             01802340
LINE 235          XYZ(NJ&2)=XB                                             01802350
LINE 236          XYZ(NJ&3)=XC                                             01802360
LINE 237          XYZ(NJ&4)=XD                                             01802370
LINE 238  C            CHECK TO SEE IF WE REACHED TRAILING EDGE (CX,DX)     01802380
LINE 239          IF( XC .GT. CX  .OR.  XD .GT. DX ) GO TO 49              01802390
LINE 240          GO TO 50                                                 01802400
LINE 241    49    CONTINUE                                                 01802410
LINE 242          XYZ(NJ&3)=CX                                             01802420
```

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LINE 243          XYZ(NJ&4)=DX                                                  01802430
LINE 244          GO TO 60                                                      01802440
LINE 245       50 CONTINUE                                                      01802450
LINE 246    C                                                                   01802460
LINE 247       60 CONTINUE                                                      01802470
LINE 248          NNCH(I) = NE & NETSV                                          01802480
LINE 249    C                                                                   01802490
LINE 250      100 CONTINUE                                                      01802500
LINE 251    C                                                                   01802510
LINE 252    C           UPDATE COUNTER OF TOTAL ELEMENTS FOR STRUCTURE        01802520
LINE 253          NETSV = NETSV & NE                                            01802530
LINE 254          RETURN                                                        01802540
LINE 255          END                                                           01802550
```

DISPLAY...FILE DECK 19

```
LINE    1        SUBROUTINE  MFUN ( JMODE)                                                    01900010
LINE    2        COMMON  / MODEF /  EM(10), DM(10), X, Y, J1, J2                             01900020
LINE    3        DIMENSION   CTABLE(6,20), IFTABL(2,20)                                      01900030
LINE    4        COMMON /MCOM/  CTABLE, IFTABL, NTABL,NEQF                                   01900040
LINE    5        DO  200   IH = 1, JMODE                                                     01900050
LINE    6        EM(IH) = 0.0                                                                01900060
LINE    7        DM(IH) =0.0                                                                 01900070
LINE    8        DO  100         I =1,NEQF                                                   01900080
LINE    9        IFW =  IFTABL (1, I)                                                        01900090
LINE   10        IFM =  IFTABL (2,I)                                                         01900100
LINE   11        IF( (IFW.EQ. J1) .AND. ( IFM.EQ.IH) )   GO TO 90                            01900110
LINE   12        GO TO 100                                                                   01900120
LINE   13   90   CO =  CTABLE ( 1 ,I )                                                      01900130
LINE   14        CX =  CTABLE ( 2 ,I )                                                       01900140
LINE   15        CY =  CTABLE ( 3 ,I )                                                       01900150
LINE   16        CXY=  CTABLE ( 4 ,I )                                                       01900160
LINE   17        CX2=  CTABLE ( 5 ,I )                                                       01900170
LINE   18        CY2=  CTABLE ( 6 ,I )                                                       01900180
LINE   19        EM(IH) =  CO & CX *X  &CY * Y & CXY* X * Y & CX2 *X**2 &CY2*Y**2            01900190
LINE   20        DM(IH) =  CX & CXY * Y  & 2.0 * CX2* X                                      01900200
LINE   21        GO TO  200                                                                  01900210
LINE   22   100  CONTINUE                                                                    01900220
LINE   23   200  CONTINUE                                                                    01900230
LINE   24        RETURN                                                                      01900240
LINE   25        END                                                                         01900250
```

DISPLAY...FILE DECK 20

```
LINE    1          SUBROUTINE MXERR(IERR,MXNO,NOIN,I6)                                          02000010
LINE    2          WRITE (I6,700)                                                               02000020
LINE    3          IF(IERR .EQ. 610 ) WRITE(I6,710) MXNO, NOIN                                  02000030
LINE    4          IF(IERR .EQ. 620 ) WRITE(I6,720) MXNO, NOIN                                  02000040
LINE    5          IF(IERR .EQ. 630 ) WRITE(I6,730) MXNO, NOIN                                  02000050
LINE    6          IF(IERR .EQ. 640 ) WRITE(I6,740) MXNO, NOIN                                  02000060
LINE    7          IF(IERR .EQ. 650 ) WRITE(I6,750) MXNO, NOIN                                  02000070
LINE    8          IF(IERR .EQ. 660 ) WRITE(I6,760) MXNO, NOIN                                  02000080
LINE    9          IF(IERR .EQ. 670 ) WRITE(I6,770) MXNO, NOIN                                  02000090
LINE   10          IF( IERR.EQ. 680)  WRITE(I6, 780) MXNO,NOIN                                  02000100
LINE   11     700  FORMAT(1HO ///8X,   42HERROR IN INPUT    MAXIMUM ALLOWED EXCEEDED)         02000110
LINE   12     710  FORMAT(1HO /  8X,   20HMAXIMUM NO. WINGS = 113,6X,          4H NO.         02000120
LINE   13         1 ,9H INPUT = 113 )                                                          02000130
LINE   14     720  FORMAT(1HO /  8X,30HMAXIMUM NO. SECTIONS / WING = 111, 6X,  4H NO.         02000140
LINE   15         1 ,9H INPUT = 113 )                                                          02000150
LINE   16     730  FORMAT(1HO /  8X,20HMAXIMUM NO. MODES =   113,6X,           4H NO.         02000160
LINE   17         1 ,9H INPUT = 113 )                                                          02000170
LINE   18     740  FORMAT(1HO /  8X,20HMAXIMUM NO. SPANS =   113,6X,           4H NO.         02000180
LINE   19         1 ,9H INPUT = 113 )                                                          02000190
LINE   20     750  FORMAT(1HO /  8X,28HMAXIMUM NO. CORNER POINTS = 111,6X,     4H NO.         02000200
LINE   21         1 ,9H INPUT =  113  )                                                        02000210
LINE   22     760  FORMAT(1HO /  8X,26HMAXIMUM NO. FREQUENCIES =  112,6X,      4H NO.         02000220
LINE   23         1 ,9H INPUT = 113 )                                                          02000230
LINE   24     770  FORMAT(1HO /  8X,30HMAXIMUM NO. ELEMENTS / SPAN = 112,6X,   4H NO.         02000240
LINE   25         1 ,9H INPUT =  112  )                                                        02000250
LINE   26     780  FORMAT( 1HO, 8X,  36HMAXIMUM NO. POINTS ON SPLINE DATA = 113,6X,           02000260
LINE   27         1 4H NO., 9H INPUT = 113)                                                    02000270
LINE   28          RETURN                                                                      02000280
LINE   29          END                                                                         02000290
```

/END READ

END OF JOB.

39.6 SEC. USED .012 HRS. CHARGED 49.962 HRS. REMAINING

DISPLAY...FILE DECK 21

```
LINE    1        SUBROUTINE OUTP1( MACH, FREQ, JMODE, JWING, NS, NSP, SW, DLSPAN,   02100010
LINE    2       1                  PMSPAN, XP,  INDXI, PRES, IPW, I6, LINE, LMAX,  02100020
LINE    3       1                  NNCH, NE, TITLE, PHIW, NSPT )                   02100030
LINE    4  C                                                                        02100040
LINE    5  C          MACH       MACH NUMBER                                       02100050
LINE    6  C          FREQ       FREQUENCY                                         02100060
LINE    7  C          JMODE      MODE NUMBER                                       02100070
LINE    8  C          JWING      WING NUMBER                                       02100080
LINE    9  C          NS         NUMBER OF SECTIONS IN JWING                       02100090
LINE   10  C          NSP        NUMBER OF SPANS IN EACH SECTION OF JWING (ARRAY)  02100100
LINE   11  C          DLSPAN     LIFT/UNIT SPAN FOR EACH SPAN OF JWING (ARRAY)     02100110
LINE   12  C          PMSPAN     PITCHING MOMENT/UNIT SPAN FOR EACH SPAN (ARRAY)   02100120
LINE   13  C          XP                                                           02100130
LINE   14  C          INDXI      ELEMENT NUMBER OF FIRS ELEMENT OF JWING           02100140
LINE   15  C          PRES       ELEMENT PRESSURES FOR JWING (ARRAY)               02100150
LINE   16  C          IPW        PRINT  CONTROL FOR JWING                          02100160
LINE   17  C          IPW=1      LIFT AND PRESSURE MUMENTS/UNIT SPAN TO BE PRINTED 02100170
LINE   18  C          IPW=2      ELEMENT PRESSURES TO BE PRINTED                   02100180
LINE   19  C          IPW=3      BOTH OF THE ABOVE TO BE PRINTED                   02100190
LINE   20  C          IPW=0      NONE OF THE ABOVE TO BE PRINTED                   02100200
LINE   21  C          I6         LOGICAL UNIT NUMBER FOR OUTPUT DIVISE             02100210
LINE   22  C          SW         SPAN WIDTH (ARRAY)                                02100220
LINE   23  C          LINE       CURRENT LINE ON OUTPUT PAGE                       02100230
LINE   24  C          LMAX       MAXIMUM LINE ON A PRINTED PAGE                    02100240
LINE   25  C          NNCH       ARRAY CONTAINING ELEMENT NUMBER OF THE LAST ELEMENT02100250
LINE   26  C                     OF EVERY SPAN IN THE COMPLETE STRUCTURE            02100260
LINE   27  C          NE         ARRAY CONTAINING THE NUMBER OF ELEMENTS IN EACH   02100270
LINE   28  C                     SECTION OF JWING.                                 02100280
LINE   29  C                                                                        02100290
LINE   30        REAL MACH.                                                         02100300
LINE   31        COMPLEX          DLSPAN(1), PMSPAN(1), PRES(1)                     02100310
LINE   32        COMPLEX  PHIW(1)                                                   02100320
LINE   33        DIMENSION NNCH(1), NE(1)                                           02100330
LINE   34        DIMENSION NSP(1), SW(1)                                            02100340
LINE   35        DIMENSION  TITLE(14)                                               02100350
LINE   36  C                                                                        02100360
LINE   37        DO 15  KSPCT = 1,NSPT                                              02100370
LINE   38        IF( NNCH(KSPCT) .GE. INDXI ) GO TO 17                              02100380
LINE   39   15   CONTINUE                                                          02100390
LINE   40   17   CONTINUE                                                          02100400
LINE   41  C                                                                        02100410
LINE   42        IF( LINE .NE. LMAX&1 ) GO TO 25                                    02100420
LINE   43        WRITE( I6, 2015 ) TITLE, FREQ                                      02100430
LINE   44        LINE = 6                                                           02100440
LINE   45  C                                                                        02100450
LINE   46   25   CONTINUE                                                          02100460
LINE   47  C                                                                        02100470
LINE   48        IF( IPW .EQ. 2 ) GO TO 123                                         02100480
LINE   49  C                                                                        02100490
LINE   50  C          WRITE LIFT AND PRESSURE MOMENT TABLE                          02100500
LINE   51  C     ------------------------------------------------------------------02100510
LINE   52  C                                                                        02100520
LINE   53        IF(  LMAX - LINE .GT. 14 ) GO TO 30                                02100530
LINE   54        WRITE( I6, 2020 )                                                  02100540
LINE   55        LINE = 7                                                           02100550
LINE   56        GO TO 35                                                           02100560
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LINE   57    30   CONTINUE                                                                  02100570
LINE   58         WRITE( 16, 2021 )                                                        02100580
LINE   59         LINE = LINE & 12                                                         02100590
LINE   60    35   CONTINUE                                                                  02100600
LINE   61         WRITE( 16, 2001 ) JWING                                                  02100610
LINE   62  C                                                                               02100620
LINE   63         K = 1                                                                    02100630
LINE   64         ISPCT = KSPCT                                                            02100640
LINE   65         WRITE( 16, 2002 )JMODE, FREQ, MACH                                       02100650
LINE   66         WRITE( 16, 2003 ) XP                                                     02100660
LINE   67  C           LOOP ON SECTIONS                                                    02100670
LINE   68         DO 120  ISECT=1,NS                                                       02100680
LINE   69         NSPAN = NSP(ISECT)                                                       02100690
LINE   70  C           LOOP ON SPANS OF SECTION                                            02100700
LINE   71         DO 115  ISPAN=1,NSPAN                                                    02100710
LINE   72         WRITE(16,2004) ISECT,ISPAN,SW(ISPCT),DLSPAN(ISPCT),PMSPAN(ISPCT)         02100720
LINE   73         ISPCT = ISPCT & 1                                                        02100730
LINE   74         K = K & 1                                                                02100740
LINE   75    115  CONTINUE                                                                02100750
LINE   76         LINE = LINE & NSPAN                                                      02100760
LINE   77    120  CONTINUE                                                                02100770
LINE   78  C                                                                               02100780
LINE   79         LINE = MOD(LINE,LMAX)                                                    02100790
LINE   80  C                                                                               02100800
LINE   81      123 CONTINUE                                                                02100810
LINE   82         IF( IPW .EQ. 1 ) RETURN                                                  02100820
LINE   83  C                                                                               02100830
LINE   84  C           WRITE ELEMENT PRESSURE TABLE                                        02100840
LINE   85  C     ------------------------------------------------------------------------  02100850
LINE   86  C                                                                               02100860
LINE   87  C           CALCULATE THE NUMBER OF ELEMENTS IN JWING  'NEWJ'                   02100870
LINE   88         NEWJ = 0                                                                 02100880
LINE   89         DO 125 I=1,NS                                                            02100890
LINE   90    125  NEWJ = NEWJ & NE(I)                                                     02100900
LINE   91         INDXR = INDXI & NEWJ - 1                                                 02100910
LINE   92  C                                                                               02100920
LINE   93         IF( LMAX - LINE  .GT.  14 ) GO TO 130                                    02100930
LINE   94         WRITE( 16, 2020 )                                                        02100940
LINE   95         LINE = 7                                                                 02100950
LINE   96         GO TO 135                                                                02100960
LINE   97    130  CONTINUE                                                                02100970
LINE   98         WRITE( 16, 2021 )                                                        02100980
LINE   99         LINE = LINE & 12                                                         02100990
LINE  100    135  CONTINUE                                                                02101000
LINE  101         WRITE( 16, 2005 ) JWING                                                  02101010
LINE  102  C                                                                               02101020
LINE  103         WRITE( 16, 2002 )JMODE, FREQ, MACH                                       02101030
LINE  104         WRITE( 16, 2009 )                                                        02101040
LINE  105         INDXR = INDXI                                                            02101050
LINE  106         ISPCT = KSPCT                                                            02101060
LINE  107  C           LOOP ON SECTIONS                                                    02101070
LINE  108         DO 220  ISECT=1,NS                                                       02101080
LINE  109         NSPAN = NSP(ISECT)                                                       02101090
LINE  110  C           LOOP ON SPANS OF SECTION                                            02101100
LINE  111         DO 215  ISPAN=1,NSPAN                                                    02101110
LINE  112         NEPS = NNCH(ISPCT)- INDXR & 1                                            02101120
LINE  113         DO 210 IEL = 1,NEPS                                                      02101130
LINE  114         WRITE( 16, 2010 ) ISECT, ISPAN, INDXR, PHIW(INDXR), PRES(INDXR)          02101140
LINE  115         INDXR = INDXR & 1                                                        02101150
LINE  116    210  CONTINUE                                                                02101160
LINE  117         ISPCT = ISPCT & 1                                                        02101170
LINE  118    215  CONTINUE                                                                02101180
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LINE 119    220  CONTINUE                                                          02101190
LINE 120   C                                                                      02101200
LINE 121         LINE = LINE & NEWJ                                               02101210
LINE 122         LINE = NEWJ/3 & LINE                                             02101220
LINE 123         IF( MOD(NEWJ,3) .GT. 0 ) LINE=LINE&1                             02101230
LINE 124         LINE = MOD( LINE, LMAX )                                         02101240
LINE 125   C                                                                      02101250
LINE 126         RETURN                                                           02101260
LINE 127    2001 FORMAT(       46X, 47HLIFT AND PITCHING MOMENT PER UNIT SPAN FOR WI02101270
LINE 128        1NG, I2  )                                                        02101280
LINE 129    2002 FORMAT( 1H&,5X, 11HMODE NUMBER, I3 / 6X, 11HFREQUENCY =, F7.4,   02101290
LINE 130        1  22X, 13HMACH NUMBER =, F7.4 / )                               02101300
LINE 131    2003 FORMAT( 5X, 31H SECTION    SPAN       SPAN WIDTH,               02101310
LINE 132        1    8X,      27H--- LIFT PER UNIT SPAN ----,                     02101320
LINE 133        2 7X, 38HPITCHING MOMENT PER UNIT SPAN ABOUT X=,  E12.6 / )      02101330
LINE 134    2004 FORMAT((6X, 2I7, 5X, E12.6, 2( 7X, E12.6, 3X, E12.6, 4X )  ) )  02101340
LINE 135    2005 FORMAT( 46X,50HVELOCITY POTENTIALS AND ELEMENT PRESSURES FOR WING,02101350
LINE 136        1   I2 )                                                         02101360
LINE 137    2007 FORMAT(      3(6X,7HELEMENT,3X,8(1H-),10H PRESSURE ,9(1H-)    ) / ) 02101370
LINE 138    2008 FORMAT(          3( 6X, I7, 3X, E12.6, 3X, E12.6      )    )     02101380
LINE 139    2009 FORMAT(6X, 27HSECTION    SPAN       ELEMENT,  11X,              02101390
LINE 140        1 27H--- VELOCITY POTENTIAL ----, 11X, 8(1H-), 10H PRESSURE ,     02101400
LINE 141        2   9(1H-) / )                                                    02101410
LINE 142    2010 FORMAT( 6X, 2I7, I13,  2( 11X, E12.6, 3X, E12.6 )  )            02101420
LINE 143    2015 FORMAT( 1H1, 45X, 14A4 // 46X,11HFREQUENCY =, F7.4//1X, 65(2H &) )02101430
LINE 144    2020 FORMAT( 1H1 )                                                    02101440
LINE 145    2021 FORMAT(  / / / / / / )                                           02101450
LINE 146         END                                                              02101460
```

DISPLAY...FILE DECK 22

```
LINE    1        SUBROUTINE OUTP2( I6,NWING,XP,TL,TM,JMODE,FREQ,MACH,LINE,LMAX )   02200010
LINE    2        COMPLEX TL(4,10), TM(4,10)                                        02200020
LINE    3        REAL MACH                                                         02200030
LINE    4  C          TL         TOTAL LIFT PER WING                              02200040
LINE    5  C          TM         TOTAL MOMENT PER WING                            02200050
LINE    6  C                                                                       02200060
LINE    7  C                                                                       02200070
LINE    8  C          WRITE TABLE OF TOTAL LIFT AND PITCHING MOMENTS               02200080
LINE    9  C                                                                       02200090
LINE   10        IF(  LMAX - LINE .GT. 14 ) GO TO 30                               02200100
LINE   11        WRITE( I6, 2020 )                                                 02200110
LINE   12        LINE = 7                                                          02200120
LINE   13        GO TO 35                                                          02200130
LINE   14   30   CONTINUE                                                         02200140
LINE   15        WRITE( I6, 2021 )                                                 02200150
LINE   16        LINE = LINE & 12                                                  02200160
LINE   17   35   CONTINUE                                                         02200170
LINE   18        WRITE( I6, 2008 )                                                 02200180
LINE   19        WRITE( I6, 2002 )      FREQ, MACH                                 02200190
LINE   20        WRITE( I6, 2011 )  XP                                             02200200
LINE   21  C                                                                       02200210
LINE   22        DO 50 I=1,JMODE                                                   02200220
LINE   23        WRITE( I6,2009) (I,  J, TL(J,I), TM(J,I), J=1,NWING)              02200230
LINE   24   50   CONTINUE                                                         02200240
LINE   25  C                                                                       02200250
LINE   26        LINE = LINE & NWING*JMODE                                         02200260
LINE   27        LINE = MOD( LINE, LMAX )                                          02200270
LINE   28  C                                                                       02200280
LINE   29        RETURN                                                            02200290
LINE   30   2002 FORMAT( 6X, 11HFREQUENCY =, F7.4,                                 02200300
LINE   31       1  22X, 13HMACH NUMBER =, F7.4 / )                                02200310
LINE   32   2008 FORMAT(    46X,31HTOTAL LIFT AND PITCHING MOMENTS  )              02200320
LINE   33   2009 FORMAT((15X,I4,6X, I4, 5X, 2( 3X, E12.6), 8X, 2( 3X, E12.6 )   ) )02200330
LINE   34   2011 FORMAT(      15X, 4HMODE, 6X,                                     02200340
LINE   35       1  4HWING, 8X, 10(1H-),6H LIFT , 11(1H-), 8X, 25HPITCHING MOMENT ABO02200350
LINE   36       1UT X = ,E12.6  / )                                               02200360
LINE   37   2020 FORMAT( 1H1 )                                                    02200370
LINE   38   2021 FORMAT(  / / / / / / )                                          02200380
LINE   39        END                                                               02200390
```

DISPLAY...FILE DECK 23

```
LINE    1        SUBROUTINE OUTP3( I6, MACH, FREQ, JMODE, Q, LINE, LMAX, TITLE )   02300010
LINE    2        COMPLEX Q(10,10)                                                  02300020
LINE    3        COMPLEX ROW(3)                                                    02300030
LINE    4        REAL MACH                                                         02300040
LINE    5        DIMENSION NST(3)                                                  02300050
LINE    6        DIMENSION  TITLE(14)                                              02300060
LINE    7  C                                                                       02300070
LINE    8  C          WRITE TABLE PRINT OF GENERALIZED AERODYNAMIC COEFFIC. MATRIX 02300080
LINE    9  C                                                                       02300090
LINE   10        IF( LINE .NE. LMAX&1 ) GO TO 25                                   02300100
LINE   11        WRITE( I6, 2015 ) TITLE, FREQ                                     02300110
LINE   12        LINE = 6                                                          02300120
LINE   13        GO TO 30                                                          02300130
LINE   14  C                                                                       02300140
LINE   15   25   CONTINUE                                                         02300150
LINE   16        IF( LMAX - LINE .GE. 13&JMODE ) GO TO 30                          02300160
LINE   17        WRITE( I6, 2020 )                                                 02300170
LINE   18        LINE = 8                                                          02300180
LINE   19        GO TO 35                                                          02300190
LINE   20   30   CONTINUE                                                         02300200
LINE   21        LINE = LINE & 13                                                  02300210
LINE   22        WRITE( I6, 2021 )                                                 02300220
LINE   23   35   CONTINUE                                                         02300230
LINE   24        WRITE( I6, 2010 ) FREQ, JMODE, MACH                               02300240
LINE   25  C                                                                       02300250
LINE   26        NCL = 3                                                           02300260
LINE   27        DO 100  J=1,JMODE,3                                               02300270
LINE   28        KK = JMODE - J & 1                                                02300280
LINE   29        IF( KK .LT. 3 ) NCL = KK                                          02300290
LINE   30        DO  50  K=1,NCL                                                   02300300
LINE   31        KO = K & J - 1                                                    02300310
LINE   32   50   NST(K) = KO                                                       02300320
LINE   33        IF( J .EQ. 1 ) GO TO 65                                           02300330
LINE   34        IF( LMAX - LINE .GE. 5&JMODE ) GO TO 60                           02300340
LINE   35        WRITE( I6, 2020 )                                                 02300350
LINE   36        LINE = 6                                                          02300360
LINE   37        GO TO 65                                                          02300370
LINE   38    60  CONTINUE                                                         02300380
LINE   39        WRITE( I6, 2022 )                                                 02300390
LINE   40        LINE = LINE & 5                                                   02300400
LINE   41    65  CONTINUE                                                         02300410
LINE   42        WRITE( I6, 2011 )   NST(1)                                        02300420
LINE   43        IF( NCL .GE. 2  ) WRITE( I6, 2023 ) NST(2)                        02300430
LINE   44        IF( NCL .EQ. 3  ) WRITE( I6, 2024 ) NST(3)                        02300440
LINE   45        WRITE( I6, 2022 )                                                 02300450
LINE   46        DO 90  I=1,JMODE                                                  02300460
LINE   47        DO 80  K=1,NCL                                                    02300470
LINE   48        KO = K & J - 1                                                    02300480
LINE   49    80  ROW(K) = Q(I,KO)                                                 02300490
LINE   50    90  WRITE( I6, 2012 )    I, ( ROW(K), K=1,NCL )                       02300500
LINE   51        LINE = LINE & JMODE                                               02300510
LINE   52        LINE = MOD( LINE,LMAX )                                           02300520
LINE   53   100  CONTINUE                                                         02300530
LINE   54        RETURN                                                            02300540
LINE   55   2010 FORMAT( 10X, 11HFREQUENCY =, F7.4,  18X,                          02300550
LINE   56       1 56HGENERALIZED AERODYNAMIC COEFFICIENTS IN AGARD DEFINITION  /   02300560
```

```
LINE   57        2 10X,I3,6H MODES, 27X, 13HMACH NUMBER =, F7.4  )                    02300570
LINE   58    2011 FORMAT( / 10X, 12HDISPLACEMENT /  13X, 4HMODE, 8X,                 02300580
LINE   59         1    18H---- PRESSURE MODE, I3, 5H ---- )                         02300590
LINE   60    2012 FORMAT( 19X, I3, 3( 8X, E12.6, 2X, E12.6 )  )                      02300600
LINE   61    2015 FORMAT( 1H1, 45X, 14A4 // 46X,11HFREQUENCY =, F7.4//1X, 65(2H &) )02300610
LINE   62    2020 FORMAT( 1H1 )                                                      02300620
LINE   63    2021 FORMAT(  / / / / / / )                                             02300630
LINE   64    2022 FORMAT(   )                                                        02300640
LINE   65    2023 FORMAT( 1H&, 63X, 18H---- PPESSURE MODE, I3, 5H ---- )             02300650
LINE   66    2024 FORMAT( 1H&, 97X, 18H---- PRESSURE MODE, I3, 5H ---- )            02300660
LINE   67         END                                                                02300670
```

DISPLAY...FILE DECK 24

```
LINE    1        SUBROUTINE PHIL (XLE, XCEN,DPDX,NEPS, PHI, A,CXP, PHIW )          02400010
LINE    2        COMPLEX  B1,  B0,  AA, XI, XIP1, EX                               02400020
LINE    3        COMPLEX C1, CX, XDIFS                                             02400030
LINE    4        COMPLEX EAXI, EAXIP1, AXI, AXIP1, SUM                             02400040
LINE    5        COMPLEX PHI(1), DPDX(1), A, CXP(1)                                02400050
LINE    6        COMPLEX   PHIW(1)                                                 02400060
LINE    7        LOGICAL  WAKE1, WAKE, WAKENZ, TREDGE                              02400070
LINE    8        DIMENSION XCEN(1)                                                 02400080
LINE    9        COMMON/WAKE/  ITWM, ITW,ICNVGW,EPSW,JCNVGW                        02400090
LINE   10        COMMON /WAKEUP/ WTES(12),TREDGE, WAKE1,WAKE, WAKENZ               02400100
LINE   11        DATA C1          / (1.0, 0.0) /                                   02400110
LINE   12  C                                                                       02400120
LINE   13        IF( NEPS .EQ. 1 ) GO TO 40                                        02400130
LINE   14  C                                                                       02400140
LINE   15        XIP1 = CMPLX( XCEN(2), 0.0 )                                      02400150
LINE   16        CX = CMPLX( (XCEN(1)-XCEN(2)), 0.0 )                              02400160
LINE   17        B1 = ( DPDX(1) - DPDX(2) ) /CX                                    02400170
LINE   18        B0 = DPDX(2) - B1*XIP1                                            02400180
LINE   19        IF( CABS(A)  .LT. 1.0E-20 ) GO TO 20                              02400190
LINE   20  C                                                                       02400200
LINE   21  C                                                                       02400210
LINE   22        XI = CMPLX( XLE, 0.0 )                                            02400220
LINE   23        XIP1 = CMPLX( XCEN(1), 0.0 )                                      02400230
LINE   24        AA = A * A                                                        02400240
LINE   25        AXI = A*XI                                                        02400250
LINE   26        AXIP1 = A*XIP1                                                    02400260
LINE   27        EAXI = CEXP( AXI )                                                02400270
LINE   28        EAXIP1 = CXP(1)                                                   02400280
LINE   29        EX = C1 / EAXIP1                                                  02400290
LINE   30  C                                                                       02400300
LINE   31        SUM      =          (B1/AA)*( (AXIP1-C1)*EAXIP1 - (AXI-C1)*EAXI )  02400310
LINE   32       1                  & (B0/A)*( EAXIP1 - EAXI )                     02400320
LINE   33  C                                                                       02400330
LINE   34        PHI(1) = SUM*EX                                                   02400340
LINE   35  C                                                                       02400350
LINE   36  C                                                                       02400360
LINE   37        XI = XIP1                                                         02400370
LINE   38        DO 10  IP1=2,NEPS                                                 02400380
LINE   39        I = IP1 - 1                                                       02400390
LINE   40        XIP1 = CMPLX( XCEN(IP1), 0.0 )                                    02400400
LINE   41        CX = CMPLX( (XCEN(I)-XCEN(IP1)), 0.0 )                            02400410
LINE   42        B1 = ( DPDX(I) - DPDX(IP1) ) / CX                                 02400420
LINE   43        B0 = DPDX(IP1) - B1*XIP1                                          02400430
LINE   44  C                                                                       02400440
LINE   45        XI = XIP1                                                         02400450
LINE   46        AXI = AXIP1                                                       02400460
LINE   47        EAXI = EAXIP1                                                     02400470
LINE   48        AXIP1 = A*XIP1                                                    02400480
LINE   49        EAXIP1 = CXP(IP1)                                                 02400490
LINE   50        EX = C1 / EAXIP1                                                  02400500
LINE   51  C                                                                       02400510
LINE   52        SUM      = SUM    &(B1/AA)*( (AXIP1-C1)*EAXIP1 - (AXI-C1)*EAXI )  02400520
LINE   53       1                  & (B0/A)*( EAXIP1 - EAXI )                     02400530
LINE   54  C                                                                       02400540
LINE   55        PHI(IP1) = SUM*EX                                                 02400550
LINE   56  C                                                                       02400560
```

```
LINE   57     10  CONTINUE                                                                  02400570
LINE   58   C                                                                              02400580
LINE   59         GO TO 52                                                                 02400590
LINE   60     20  CONTINUE                                                                 02400600
LINE   61         CX = CMPLX( (XLE-XCEN(1)), 0.0 )                                         02400610
LINE   62         XDIFS = CMPLX( 0.5*(XLE*XLE-XCEN(1)*XCEN(1)), 0.0 )                      02400620
LINE   63         SUM = B0*CX & B1*XDIFS                                                   02400630
LINE   64         PHI(1) = SUM                                                             02400640
LINE   65         DO 30  IP1=2,NEPS                                                        02400650
LINE   66         I = IP1 - 1                                                              02400660
LINE   67         CX = CMPLX( (XCEN(I)-XCEN(IP1)), 0.0 )                                   02400670
LINE   68         B1 = ( DPDX(I) - DPDX(IP1) ) / CX                                        02400680
LINE   69         B0 = DPDX(IP1) - B1*XIP1                                                 02400690
LINE   70         XDIFS = CMPLX( 0.5*(XCEN(I)*XCEN(I)-XCEN(IP1)*XCEN(IP1)), 0.0 )          02400700
LINE   71         SUM = SUM & B0*CX & B1*XDIFS                                             02400710
LINE   72         PHI(IP1) = SUM                                                           02400720
LINE   73     30  CONTINUE                                                                 02400730
LINE   74         GO TO 52                                                                 02400740
LINE   75   C                                                                              02400750
LINE   76     40  CONTINUE                                                                 02400760
LINE   77   C                                                                              02400770
LINE   78   C           SECTION FOR ONLY ONE ELEMENT PER SPAN                              02400780
LINE   79   C                                                                              02400790
LINE   80          CX = CMPLX( XCEN(1)-XLE, 0.0 )                                        02400800
LINE   81         IF( CABS(A) .LT. 1.0E-20 ) GO TO 50                                      02400810
LINE   82         PHI(1) = (DPDX(1)/A)*( C1 - CEXP( -A*CX ) )                              02400820
LINE   83         GO TO 52                                                                 02400830
LINE   84     50  PHI(1) =  DPDX(1)*CX                                                    02400840
LINE   85     52  ICNVGW  = 0                                                             02400850
LINE   86   C     INITIALIZE  ICNVGW ==0                                                   02400860
LINE   87   C     ICNVGW =1 MEANS AT LEAST ONE PHI HAS NOT CONVERGED FOR SPAN              02400870
LINE   88   C     ICNVGW=0 MEANS CONVERGENCE HAS OCCURED FOR WAKE ELEMENTS                 02400880
LINE   89   C     ITW =    WAKE CONVG.  ITERATION COUNTER  INITIALLY SET =0                02400890
LINE   90   C     ITWM = MAX. NO. ITERATIONS IF WAKE EFFECT IS DESIRED                     02400900
LINE   91   C     ITWM = 0 IF WAKE ELEMENT EFFECT IS NOT DESIRED                           02400910
LINE   92         IF( ITW .EQ.0)     GO TO 58                                             02400920
LINE   93         IF( .NOT. WAKE)    GO TO 58                                             02400930
LINE   94         ICNVGW = IRELE( PHI, PHIW,NEPS)                                         02400940
LINE   95         IF( ICNVGW .EQ.0 )  JCNVGW = JCNVGW & NEPS                              02400950
LINE   96     58  CONTINUE                                                                 02400960
LINE   97         DO 60    IP1=1,NEPS                                                     02400970
LINE   98   C     IF( ITW .EQ.0)     GO TO 60                                             02400980
LINE   99   C     IF( .NOT. WAKE)    GO TO 60                                             02400990
LINE  100   C     ICNVGW =IRELE(PHI(IP1), PHIW(IP1), ICNVGW )                             02401000
LINE  101   C     IF( ICNVGW .EQ. 0 ) JCNVGW = JCNVGW & 1                                 02401010
LINE  102     60  PHIW(IP1) = PHI(IP1)                                                    02401020
LINE  103     62  RETURN                                                                   02401030
LINE  104         END                                                                      02401040
```

DISPLAY...FILE DECK 25

```
LINE    1        SUBROUTINE PLOT(X,Y,IPEN)                          02500010
LINE    2        IF( IPEN .EQ. -23) GO TO 100                       02500020
LINE    3        IF( IPEN .EQ. 23) IPEN = -3                        02500030
LINE    4        CALL CALPLT( X,Y, IPEN)                            02500040
LINE    5        RETURN                                             02500050
LINE    6    100 SX = X & 2.0                                       02500060
LINE    7        CALL NFRAME(SX,Y)                                  02500070
LINE    8        RETURN                                             02500080
LINE    9        END                                                02500090
```

DISPLAY...FILE DECK 26

```
LINE    1        SUBROUTINE PLOTGD ( NE, XYZ, NNCH, NSP, NSECT, TITLE, JWING,      02600010
LINE    2       1                    ZSECT, AR, MACH )                            02600020
LINE    3        REAL MACH                                                        02600030
LINE    4        DIMENSION  NE(1), ZSECT(1), NSP(1)                               02600040
LINE    5        DIMENSION PH(7), PV(7)                                           02600050
LINE    6        DIMENSION XYZ(1), NNCH(1), TITLE(1)                              02600060
LINE    7        DATA  FGDX, FGDY  /  15.0, 10.0  /                               02600070
LINE    8        DATA HT, HTW, HHT  /  .07, .06202, .035  /                       02600080
LINE    9        DATA  NETSV  / 1 /                                               02600090
LINE   10  C                                                                      02600100
LINE   11  C                                                                      02600110
LINE   12        IF( JWING .EQ. 1 ) NETSV = 1                                     02600120
LINE   13        NEPWT = 0                                                        02600130
LINE   14        KINDEX = 1                                                       02600140
LINE   15        KFIRST = 1                                                       02600150
LINE   16        KLAST = 0                                                        02600160
LINE   17  C                                                                      02600170
LINE   18        DO 100  IS=1,NSECT                                               02600180
LINE   19  C                                                                      02600190
LINE   20        NEPS = NE(IS)                                                    02600200
LINE   21        K = KINDEX                                                       02600210
LINE   22        XMAX = XYZ(K)                                                    02600220
LINE   23        XMIN = XMAX                                                      02600230
LINE   24        YMAX = XYZ(K&4)                                                  02600240
LINE   25        YMIN = YMAX                                                      02600250
LINE   26        DO 10  I=1,NEPS                                                  02600260
LINE   27        DO 3  J = 1,4                                                    02600270
LINE   28        XMIN = AMIN1( XMIN, XYZ(K) )                                     02600280
LINE   29        XMAX = AMAX1( XMAX, XYZ(K) )                                     02600290
LINE   30     3  K = K & 1.                                                       02600300
LINE   31        DO 6  J=1,2                                                      02600310
LINE   32        YMIN = AMIN1( YMIN, XYZ(K) )                                     02600320
LINE   33        YMAX = AMAX1( YMAX, XYZ(K) )                                     02600330
LINE   34     6  K = K & 1                                                       02600340
LINE   35    10  CONTINUE                                                       02600350
LINE   36  C         FGDX =  MAXIMUN X PLOT SIZE                                02600360
LINE   37  C         FGDY  = MAXIMUM Y  PLOT SIZE                               02600370
LINE   38        SFH = (XMAX-XMIN)/FGDX                                           02600380
LINE   39        SFV = (YMAX-YMIN)/FGDY                                           02600390
LINE   40  C         SF   IS A SCALE FACTOR SUCH THAT 1 INCH = SF                02600400
LINE   41        SF = AMAX1( SFH,SFV )                                            02600410
LINE   42  C         TMXX  AND  TMYY  ARE THE ACTUAL DIMENSION OF THE PLOT       02600420
LINE   43        TMXX = (XMAX-XMIN)/SF                                            02600430
LINE   44        TMYY = (YMAX-YMIN)/SF                                            02600440
LINE   45        PH(6) = XMIN                                                     02600450
LINE   46        PH(7) = SF                                                       02600460
LINE   47        PV(6) = YMIN                                                     02600470
LINE   48        PV(7) = SF                                                       02600480
LINE   49  C     WRITE(6,1002 )  XMAX, XMIN, YMAX, YMIN,                          02600490
LINE   50  C    1          SFH, SFV, TMXX, TMYY, SF                              02600500
LINE   51  C                                                                      02600510
LINE   52  C          DRAW LINE TO MARK ORIGINAL ORIGIN, LIFT PEN, AND REORIGIN   02600520
LINE   53  C                                                                      02600530
LINE   54        CALL PLOT( 0.25, 0.0, 2 )                                        02600540
LINE   55        CALL PLOT( 0.75, 0.0, 3 )                                        02600550
LINE   56        CALL PLOT( 2.0, 0.25, 23 )                                       02600560
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LINE   57  C                                                                  02600570
LINE   58  C        SECTION TO PUT TITLE AND HEADING ON PLOT                   02600580
LINE   59  C                                                                  02600590
LINE   60        Y = 0.25                                                     02600600
LINE   61        DO 12  I=1,14                                                02600610
LINE   62        CALL SYMBOL ( -1.5, Y, .21, TITLE(I), 90.0, 4 )              02600620
LINE   63     12 Y = Y & 0.728                                                02600630
LINE   64  C                                                                  02600640
LINE   65        CALL SYMBOL ( -1.15, .25, .21, 14HASPECT RATIO =, 90.0, 14 ) 02600650
LINE   66        CALL NUMBER ( -1.15, 2.98, .21, AR, 90.0,  3 )               02600660
LINE   67        CALL SYMBOL ( -1.15, 4.7, .21,  13HMACH NUMBER =, 90.0, 13 ) 02600670
LINE   68        CALL NUMBER ( -1.15, 7.10, .21, MACH, 90.0, 3 )              02600680
LINE   69        CALL SYMBOL ( -0.80, .25,  .21, 14HSECTION NUMBER, 90.0, 14 ) 02600690
LINE   70        FPN =FLOAT(IS)                                               02600700
LINE   71        CALL NUMBER ( -0.80,  2.98, .21, FPN, 90.0, -1 )             02600710
LINE   72        CALL SYMBOL ( -0.80, 3.52, .21,  7HOF WING,  90.0, 7 )       02600720
LINE   73        FPN = FLOAT(JWING)                                           02600730
LINE   74        CALL NUMBER ( -0.80, 4.97, .21, FPN, 90.0, -1 )              02600740
LINE   75        CALL SYMBOL ( -0.80, 6.33, .21, 3HZ =, 90.0, 3 )             02600750
LINE   76        FPN = ZSECT(IS)                                              02600760
LINE   77        CALL NUMBER ( -0.80, 7.06, .21, FPN, 90.0, 3 )               02600770
LINE   78  C                                                                  02600780
LINE   79  C        SECTION TO PLOT ELEMENTS                                  02600790
LINE   80  C                                                                  02600800
LINE   81        K = KINDEX                                                   02600810
LINE   82        DO 20  I=1,NEPS                                              02600820
LINE   83        DO 19  J=1,4                                                 02600830
LINE   84        PH(J) = XYZ(K)                                               02600840
LINE   85        IF( J .GT. 2 ) GO TO 19                                      02600850
LINE   86        PV(J) = XYZ(K&4)                                             02600860
LINE   87     19 K = K & 1                                                    02600870
LINE   88        PV(3) = XYZ(K&1)                                             02600880
LINE   89        PV(4) = XYZ(K)                                               02600890
LINE   90        K = K & 2                                                    02600900
LINE   91        PH(5) = PH(1)                                                02600910
LINE   92        PV(5) = PV(1)                                                02600920
LINE   93  C     WRITE(6,1003 )  I, ( PH(IJ),IJ=1,5), (PV(IJ),IJ=1,5)         02600930
LINE   94        CALL LINE( PH, PV, 5, 1, 0, 0, 0.0)                          02600940
LINE   95     20 CONTINUE                                                     02600950
LINE   96  C                                                                  02600960
LINE   97  C        SECTION TO LABLE ELEMENTS ON THE TRAILING EDGE            02600970
LINE   98  C                                                                  02600980
LINE   99        KLAST = NSP(IS) & KLAST                                      02600990
LINE  100        DO 30 I=KFIRST,KLAST                                         02601000
LINE  101  C          NETSV IS THE NUMBER OF ELEMENTS IN THE PREVIOUS WINGS PLUS 1 02601010
LINE  102        J = 6*(NNCH(I)-NETSV) & 1                                    02601020
LINE  103        SFH = 0.25*( XYZ(J) & XYZ(J&1) &XYZ(J&2) & XYZ(J&3) )        02601030
LINE  104        SFV = 0.50*( XYZ(J&4) & XYZ(J&5))                            02601040
LINE  105        SFH = (SFH-XMIN)/SF & HHT                                    02601050
LINE  106        SFV = (SFV-YMIN)/SF - HTW                                    02601060
LINE  107  C        (SFH,SFV) ARE COORDINATES OF CENTER OF ELEMENT             02601070
LINE  108  C        TO CENTER CHARACTER, MOVE OFF CENTER BY (HTW,HHT)          02601080
LINE  109        GP =  FLOAT(  NNCH(I)  )                                     02601090
LINE  110        CALL NUMBER( SFH, SFV, HT, GP, 90.0, -1 )                    02601100
LINE  111     30 CONTINUE                                                     02601110
LINE  112        KFIRST = KFIRST & NSP(IS)                                    02601120
LINE  113  C                                                                  02601130
LINE  114  C          SECTION TO REORIGIN FOR NEXT PLOT AND BUMP BLOCK ADDRESS BY 02601140
LINE  115  C                                                                  02601150
LINE  116        SX = TMXX & 3.0                                              02601160
LINE  117        SX = AMAX1( SX, 17. )                                        02601170
LINE  118        CALL PLOT( SX, -.25,-23 )                                    02601180
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LINE 119  C                                                                    02601190
LINE 120  C          UPDATE COUNTER OF ELEMENTS IN WING                        02601200
LINE 121        NEPWT = NEPWT & NEPS                                           02601210
LINE 122        KINDEX = KINDEX & 6*NEPS                                       02601220
LINE 123  C                                                                    02601230
LINE 124  C          END LOOP ON SECTIONS                                      02601240
LINE 125   100  CONTINUE                                                       02601250
LINE 126  C          UPDATE ELEMENT COUNTER                                    02601260
LINE 127  C          NETSV IS THE NUMBER OF ELEMENTS IN THE PREVIOUS WINGS PLUS 1 02601270
LINE 128        NETSV = NETSV & NEPWT                                          02601280
LINE 129  C                                                                    02601290
LINE 130        RETURN                                                         02601300
LINE 131  C1002 FORMAT( //   ' XMAX,XMIN', 2E14.4, 5X, 'YMAX,YMIN', 2E14.4 //  02601310
LINE 132  C     2                                    ' SFH ,SFV ', 2E14.4 //   02601320
LINE 133  C     3             ' TMXX,TMYY', 2E14.4, 5X, 'SF       ', 1E14.4 //  02601330
LINE 134  C     4/  ' PH FOLLOWED BY PV FOR EVERY ELEMENT '  /  )               02601340
LINE 135  C1003 FORMAT( //  I5, 2(/ 5X, 5E14.4 )  )                           02601350
LINE 136        END                                                            02601360
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DISPLAY...FILE          DECK 27

LINE    1        SUBROUTINE PTGRID( I6, TITLE, MACH, NWING, NSECT, NSP, NNCH, XYZ,  02700010
LINE    2       1                   ZSECT, REFLEN, BEETA, XCEN )                    02700020
LINE    3        REAL MACH                                                          02700030
LINE    4        DIMENSION NNCH(1), NSP(3,1)                                        02700040
LINE    5        DIMENSION TITLE(14), NSECT(1), XYZ(1), ZSECT(3,4)                  02700050
LINE    6        DIMENSION XCEN(1)                                                  02700060
LINE    7        DIMENSION XY(8)                                                    02700070
LINE    8        BL = BEETA*REFLEN                                                  02700080
LINE    9        WRITE( I6,3000 ) TITLE, MACH                                       02700090
LINE   10        WRITE( I6, 3003 )                                                  02700100
LINE   11        KSPAN = 0                                                          02700110
LINE   12        K = 0                                                              02700120
LINE   13        N1 = 1                                                             02700130
LINE   14        DO 100 J=1,NWING                                                   02700140
LINE   15        NS = NSECT(J)                                                      02700150
LINE   16        DO 95  I=1,NS                                                      02700160
LINE   17        WRITE( I6,3001) J, I, ZSECT(I,J)                                   02700170
LINE   18        NSPAN = NSP(I,J)                                                   02700180
LINE   19        DO 90 ISPAN =1,NSPAN                                               02700190
LINE   20        KSPAN = KSPAN & 1                                                  02700200
LINE   21        NEPS = NNCH(KSPAN) - K                                             02700210
LINE   22        DO 85 IE = 1,NEPS                                                  02700220
LINE   23        K = K & 1                                                          02700230
LINE   24        XY(7) = 0                                                          02700240
LINE   25        IN = N1                                                            02700250
LINE   26        DO  80  JJ = 1, 4                                                  02700260
LINE   27        XY(JJ) = XYZ(IN)*BL                                                02700270
LINE   28        XY(7)  = XY(7) & XY(JJ)                                            02700280
LINE   29        IN = IN & 1                                                        02700290
LINE   30     80 CONTINUE                                                           02700300
LINE   31        XY(7) = XY(7)/4.0                                                  02700310
LINE   32        XY(5) = XYZ(IN)*REFLEN                                             02700320
LINE   33        XY(6) = XYZ(IN&1)*REFLEN                                           02700330
LINE   34        XY(8) = 0.5*( XY(5) & XY(6) )                                      02700340
LINE   35        WRITE( I6, 3002 ) ISPAN, K, XY                                     02700350
LINE   36        XCEN(K) = XY(7)/BL                                                 02700360
LINE   37        N1 = N1 & 6                                                        02700370
LINE   38     85 CONTINUE                                                           02700380
LINE   39     90 CONTINUE                                                           02700390
LINE   40     95 CONTINUE                                                           02700400
LINE   41    100 CONTINUE                                                           02700410
LINE   42        RETURN                                                             02700420
LINE   43   3000 FORMAT(1H1/35X,14A4//35X, 32HAERODYNAMIC GRID FOR MACH NUMBER,     02700430
LINE   44       1  F8.4 / )                                                        02700440
LINE   45   3001 FORMAT( /  6H  WING, I2, 8H SECTION, I2 /  5H  Z =,2X,E11.5/      02700450
LINE   46       1       14H SPAN  ELEMENT, 4X, 2HX1, 12X, 2HX2, 12X, 2HX3, 12X,2HX4,02700460
LINE   47       2 12X, 2HY1, 12X, 2HY2, 13X, 2HXC, 12X, 2HYC / )                   02700470
LINE   48   3002 FORMAT( I5, I9, 1X, 6( 3X, E11.5), 4X, E11.5, 3X, E11.5 )        02700480
LINE   49   3003 FORMAT(  /                          35X,  30HSTRUCTURAL REFERENCE SYS02700490
LINE   50       1TEM OR  /  35X, 35HROTATED STRUCTURAL REFERENCE SYSTEM  /  )      02700500
LINE   51        END                                                               02700510
```

DISPLAY...FILE DECK 28

```
LINE    1        SUBROUTINE  RDETA (  I13, DETADX, ETA, NET)                02800010
LINE    2        DIMENSION  DETADX(NET) , ETA(NET)                          02800020
LINE    3        READ (I13)                                                  02800030
LINE    4       1     JM1,NET1, DETADX, ETA                                 02800040
LINE    5        RETURN                                                      02800050
LINE    6        END                                                         02800060
```

DISPLAY...FILE DECK 29

```
LINE    1        SUBROUTINE RDMODE( JMODE, NWING, NSECT, NE, XCEN, XYZ, BEETA,      02900010
LINE    2       1  REFLEN,NET,LAB, ID,ERROR,ETA,DETADX,I5,I6, XF,YF,  A, NMX,IERR) 02900020
LINE    3        LOGICAL ERROR                                                      02900030
LINE    4  C           ETA AND DETADX DIMENSIONED  ( NUMBER OF ELEMENTS, NO. MODE)02900040
LINE    5        DIMENSION  CFTABL(6,20), IFTABL(2,20)                              02900050
LINE    6        DIMENSION  ETA(NET,1), DETADX(NET,1)                               02900060
LINE    7        DIMENSION ID(1)                                                    02900070
LINE    8        DIMENSION MODE(20)                                                 02900080
LINE    9        DIMENSION  MODEF4(6)                                               02900090
LINE   10        DIMENSION  NCHECK(4,3)                                             02900100
LINE   11        DIMENSION  NSECT(1), NE(3,1), XCEN(1), XYZ(1)                      02900110
LINE   12        DIMENSION  NUMBR(3), MODEF1(7), MODEF2(13), MODEF3(7)              02900120
LINE   13        DIMENSION  XF(1),YF(1),  A(1)                                      02900130
LINE   14        COMMON /MCOM/ CFTABL, IFTABL, NTABL, NEQF                          02900140
LINE   15        COMMON  / MODEF /  EM(10), DM(10), X, Y, J1, J2                    02900150
LINE   16        COMMON /XYSCAL / XX, YY, XO, YC, BREF, ZZZ, ITEST                  02900160
LINE   17        COMMON /ZFUNNY/ N,IERF, B1,B2, B3,NFUNMX                           02900170
LINE   18        DATA  LBLANK  / 4H     /                                           02900180
LINE   19        DATA  LEND / 3HEND   /                                             02900190
LINE   20        DATA LMW  / 4HMDWI  /                                              02900200
LINE   21        DATA  LRIG          /  4HRIGM /                                    02900210
LINE   22        DATA MODONE  / 2H ) /                                              02900220
LINE   23        DATA MODEF1 /  3H(//, 1H1, 4H(24X, 4H,4HM, 4HODE,, 4HI2,3, 3HX)) /02900230
LINE   24        DATA MODEF2 /  4H(10H, 4H   E, 4HLEME, 3HNT,, 1H1, 4H(10X, 4H,3HE,02900240
LINE   25       1     4HTA,9, 4HX,11, 4HHD(E, 4HTA)/, 4HDX  , 3H)/) /              02900250
LINE   26        DATA MODEF3 / 4H((I1, 2H0,, 1H1, 4H(3X,, 4H2E15, 4H.6)), 1H)  /   02900260
LINE   27        DATA MODEF4  / 4H(/ 2, 4HOX,I, 1H1, 4H,6H , 4HMODE, 2HS)  /       02900270
LINE   28        DATA  NCHECK  / 12*0   /                                           02900280
LINE   29        DATA NUMBR   /  1H1, 1H2, 1H3  /                                   02900290
LINE   30  C                                                                       02900300
LINE   31        XO    = 0.0                                                       02900310
LINE   32        YO    = 0.0                                                       02900320
LINE   33        BREF = 1.0                                                        02900330
LINE   34        JMODE = 0                                                         02900340
LINE   35        WRITE(I6,1999)  ID(1),ID(2),ID(3),ID(4)                           02900350
LINE   36        IF( ID(1) .EQ. 0 ) RETURN                                         02900360
LINE   37   1999 FORMAT    (// 21X,  18HTOTAL NUMBER MODES,21X,I12/21X, 6HMODES ,  02900370
LINE   38       132HDEFINED BY SPLINE OR POLYNOMIAL  , 1X, I12/21X,  9HNUMBER OF , 02900380
LINE   39       2       13H RIGID MODES ,17X, I12 / 21X,21HNUMBER OF POLYNOMIAL  , 02900390
LINE   40       310HEQUATIONS  ,  8X, I12  ///)                                    02900400
LINE   41        JRIGID = ID(1)                                                    02900410
LINE   42        JTYPE = ID(4)                                                     02900420
LINE   43  C     RDMODE                                                            02900430
LINE   44        IF( LAB .EQ. LRIG  ) GO TO 215                                    02900440
LINE   45        JMODE = ID(2)                                                     02900450
LINE   46        BR = BEETA*REFLEN                                                 02900460
LINE   47        HALFR = 0.5*REFLEN                                                02900470
LINE   48        IF( JMODE .GE. 10 ) MODEF4(3) = NUMBR(2)                          02900480
LINE   49        IF( JMODE .EQ. 1 )  MODEF4(6) = MODONE                            02900490
LINE   50  C                                                                       02900500
LINE   51        IF( JTYPE .EQ. 0 )  GO TO 10                                      02900510
LINE   52        WRITE( I6, 2001 )                                                 02900520
LINE   53        WRITE(6,2009)                                                     02900530
LINE   54        NEQF = JTYPE                                                      02900540
LINE   55        WRITE( I6, 400)  NEQF                                             02900550
LINE   56        DO  500          I=1,NEQF                                         02900560
```

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LINE   57        READ (I5, 405)    IEQ, IFTABL(1, IEQ) , IFTABL(2, IEQ),                02900570
LINE   58       1   (CFTABL( J, IEQ),  J=1, 6)                                         02900580
LINE   59        WRITE(I6, 410)    IEQ, (IFTABL( J, IEQ), J=1,2) ,(CFTABL(J,IEQ),      02900590
LINE   60       1    J =1,6 )                                                          02900600
LINE   61    500 CONTINUE                                                             02900610
LINE   62  C           LOOP OVER ELEMENTS BY WING SECTION                             02900620
LINE   63        J = 5                                                                02900630
LINE   64        I = 1                                                                02900640
LINE   65        DO 600 J1=1,NWING                                                    02900650
LINE   66        NS = NSECT(J1)                                                       02900660
LINE   67        DO 395 J2=1,NS                                                       02900670
LINE   68        IN1 = NE(J2,J1)                                                      02900680
LINE   69        DO 390 K=1,IN1                                                       02900690
LINE   70        X = XCEN(I)*BR                                                       02900700
LINE   71        Y =     ( XYZ(J) & XYZ(J&1) ) * HALFR                                02900710
LINE   72        CALL  MFUN ( JMODE)                                                  02900720
LINE   73        DO 380 IH=1,JMODE                                                    02900730
LINE   74        ETA(I,IH) = EM(IH)                                                   02900740
LINE   75        DETADX(I,IH) = DM(IH)                                                02900750
LINE   76    380 CONTINUE                                                             02900760
LINE   77        I = I & 1                                                            02900770
LINE   78        J = J&6                                                              02900780
LINE   79    390 CONTINUE                                                             02900790
LINE   80    395 CONTINUE                                                             02900800
LINE   81    600 CONTINUE                                                             02900810
LINE   82        IN1 = 1                                                              02900820
LINE   83        IN2 = NET                                                            02900830
LINE   84        GO TO 132                                                            02900840
LINE   85     10 CONTINUE                                                             02900850
LINE   86  C           READ MDWING CARD                                               02900860
LINE   87  C                                                                          02900870
LINE   88        READ( I5, 1000) LAB, NW, NI1, NI2, NI3                               02900880
LINE   89  C                                                                          02900890
LINE   90        IF( LAB .EQ. LEND ) GO TO 330                                        02900900
LINE   91        IF( LAB .NE. LMW )  GO TO  300                                       02900910
LINE   92  C                                                                          02900920
LINE   93  C           CHECK TO SEE IF SECTION IS DEFINED                             02900930
LINE   94        IF( NW .GT. NWING ) GO TO 310                                        02900940
LINE   95  C                                                                          02900950
LINE   96  C           HOW MANY SECTIONS ARE DEFINED                                  02900960
LINE   97  C                                                                          02900970
LINE   98        NSI = 3                                                              02900980
LINE   99        IF( NI3 .EQ. 0 ) NSI = 2                                             02900990
LINE  100        IF( NI2 .EQ. 0 ) NSI = 1                                             02901000
LINE  101        IF( NI1 .EQ. 0 ) GO TO 310                                           02901010
LINE  102  C         IF 2 SECTIONS ARE INPUT, THEY MUST BE CONTINUOUS                  02901020
LINE  103  C                                                                          02901030
LINE  104        IF( NSI .EQ. 2  .AND. IABS(NI2-NI1) .NE. 1 ) GO TO 320               02901040
LINE  105  C                                                                          02901050
LINE  106  C           FIND FIRST AND LAST SECTION FOR THIS MODE GROUP                 02901060
LINE  107  C                                                                          02901070
LINE  108        NSF = NI1                                                            02901080
LINE  109        NSL = NI1                                                            02901090
LINE  110        WRITE( I6, 2001 )                                                    02901100
LINE  111        WRITE( I6, 2002 ) NW, NI1                                            02901110
LINE  112        IF( NSI .EQ. 1 ) GO TO 20                                            02901120
LINE  113        NSF = MINO( NSF,NI2 )                                                02901130
LINE  114        NSL = MAXO( NSL,NI2 )                                                02901140
LINE  115        WRITE( I6, 2002 ) NW, NI2                                            02901150
LINE  116        IF( NSI .EQ. 2 ) GO TO 20                                            02901160
LINE  117        NSF = MINO( NSF, NI3 )                                               02901170
LINE  118        NSL = MAXO( NSL, NI3 )                                               02901180
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LINE 119          WRITE( I6, 2002 ) NW, NI3                                    02901190
LINE 120    20    CONTINUE                                                     02901200
LINE 121    C                                                                  02901210
LINE 122    C          MORE CHECK TO SEE IF SECTION IS DEFINED                 02901220
LINE 123          IF( NSL .GT. NSECT(NW) )GO TO 310                            02901230
LINE 124    C                                                                  02901240
LINE 125    C          FIND FIRST AND LAST ELEMENT NUMBERS, IN1, IN2           02901250
LINE 126    C                                                                  02901260
LINE 127          IN1 = 1                                                      02901270
LINE 128          IF( NW .EQ. 1 ) GO TO 30                                     02901280
LINE 129    C          FIND NUMBER OF ELEMENTS IN LOWER NUMBER WINGS           02901290
LINE 130          NWM1 = NW - 1                                                02901300
LINE 131          DO 25  J=1,NWM1                                              02901310
LINE 132          NS = NSECT(J)                                                02901320
LINE 133          DO 25  I=1,NS                                                02901330
LINE 134    25    IN1 = IN1 & NE(I,J)                                          02901340
LINE 135    C                                                                  02901350
LINE 136    30    CONTINUE                                                     02901360
LINE 137          IF( NSF .EQ. 1 ) GO TO 40                                    02901370
LINE 138    C          FIND NUMBER OF ELEMENTS IN LOWER NUMBER SECTIONS OF WING NW  02901380
LINE 139          NS = NSF - 1                                                 02901390
LINE 140          DO 35  I=1,NS                                                02901400
LINE 141    35    IN1 = IN1 & NE(I,NW)                                         02901410
LINE 142    C                                                                  02901420
LINE 143    40    CONTINUE                                                     02901430
LINE 144    C          NOW THAT WE HAVE IN1, FIND LAST ELEMENT IN2              02901440
LINE 145    C                                                                  02901450
LINE 146          IN2 = IN1 & NE(NSF,NW) - 1                                   02901460
LINE 147          NCHECK(NSF,NW) = 1                                           02901470
LINE 148          IF( NSI .EQ. 1 ) GO TO 45                                    02901480
LINE 149    C                                                                  02901490
LINE 150          IN2 = IN2 & NE(NSF&1,NW)                                     02901500
LINE 151          NCHECK(NSF&1,NW) = 1                                         02901510
LINE 152          IF( NSI .EQ. 2 ) GO TO 45                                    02901520
LINE 153          IN2 = IN2 & NE(NSL,NW)                                       02901530
LINE 154          NCHECK(NSL,NW) = 1                                           02901540
LINE 155    45    CONTINUE                                                     02901550
LINE 156    C                                                                  02901560
LINE 157    C          IN1 AND IN2 HAVE BEEN FOUND                             02901570
LINE 158    C                                                                  02901580
LINE 159          WRITE( I6, MODEF4 ) JMODE                                    02901590
LINE 160          WRITE( I6, 2003 )                                            02901600
LINE 161          WRITE( I6, 2008 )                                            02901610
LINE 162    C                                                                  02901620
LINE 163    C          SECTION TO READ MODE DATA                               02901630
LINE 164    C     ------------------------------------------------------------02901640
LINE 165    C                                                                  02901650
LINE 166    C          READ MODE INPUT                                         02901660
LINE 167    C              MODE CARD HAS BEEN READ                             02901670
LINE 168    C                                                                  02901680
LINE 169          NFUNMX = NMX                                                 02901690
LINE 170          CALL READXY( XF,YF)                                          02901700
LINE 171          IERR = IERF                                                  02901710
LINE 172          IF( IERR .NE.0)  RETURN                                      02901720
LINE 173    C                                                                  02901730
LINE 174          DO 130 J=1,JMODE                                             02901740
LINE 175          READ( I5, 1006 ) MODE                                        02901750
LINE 176          WRITE( I6,1016 ) MODE                                        02901760
LINE 177          CALL READAB(A, A)                                            02901770
LINE 178          IF( ITEST .EQ. 0 ) GO TO 110                                 02901780
LINE 179          DO 105 I = IN1, IN2                                          02901790
LINE 180          ETA(I,J) = ZZZ                                               02901800
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LINE 181          DETADX(I,J) = 0.0                                                    02901810
LINE 182    105   CONTINUE                                                             02901820
LINE 183          GO TO 130                                                            02901830
LINE 184    110   CONTINUE                                                             02901840
LINE 185    C           BUMP INDXR TO FIRST ELEMENT IN SECTION                         02901850
LINE 186          INDXR = 6*(IN1-1) & 1                                                02901860
LINE 187          DO 120 I = IN1, IN2                                                  02901870
LINE 188    C           NOTE XO, YO ARE COOR. OF CENTER OF ELEM IN UNNORMALIZED       02901880
LINE 189    C           STRUCTURAL REFERENCE SYSTEM                                    02901890
LINE 190          XX = HR*XCEN(I)                                                      02901900
LINE 191          YY = HALFR*(XYZ(INDXR&4) & XYZ(INDXR&5))                             02901910
LINE 192          INDXR = INDXR & 6                                                    02901920
LINE 193    C                                                                          02901930
LINE 194          CALL ZFDZ( ETA(I,J), DETADX(I,J), XF,YF,A)                           02901940
LINE 195    C                                                                          02901950
LINE 196    120   CONTINUE                                                             02901960
LINE 197    C                                                                          02901970
LINE 198    130   CONTINUE                                                             02901980
LINE 199    C                                                                          02901990
LINE 200    132   CONTINUE                                                             02902000
LINE 201    C                                                                          02902010
LINE 202          IPR = 1                                                              02902020
LINE 203          WRITE( I6, 2004 ) IPR                                                02902030
LINE 204          IF(JTYPE .NE.0)   GO TO    135                                       02902040
LINE 205          WRITE( I6, 2002 ) NW, NI1                                            02902050
LINE 206          IF( NSI .GE. 2 ) WRITE( I6, 2002 )  NW, NI2                          02902060
LINE 207          IF( NSI .EQ. 3 ) WRITE( I6, 2002 )  NW, NI3                          02902070
LINE 208    135   CONTINUE                                                             02902080
LINE 209          WRITE( I6, 2005 )                                                    02902090
LINE 210          WRITE( I6, 2008 )                                                    02902100
LINE 211          J1 = 1                                                               02902110
LINE 212          IHS = JMODE/3                                                        02902120
LINE 213          IF( 3*IHS .NE. JMODE ) IHS = IHS & 1                                 02902130
LINE 214    C                                                                          02902140
LINE 215          DO 138 IH = 1,IHS                                                    02902150
LINE 216          J2 = J1 & 2                                                          02902160
LINE 217          IF( J2 .GT. JMODE ) J2 = JMODE                                       02902170
LINE 218          INUMB = J2 - J1 & 1                                                  02902180
LINE 219          MODEF1(2) = NUMBR(INUMB)                                             02902190
LINE 220          MODEF2(5) = NUMBR(INUMB)                                             02902200
LINE 221          MODEF3(3) = NUMBR(INUMB)                                             02902210
LINE 222          IF( IH .GE. 2 ) WRITE( I6, 2010 )                                    02902220
LINE 223          WRITE( I6, MODEF1 ) ( I, I=J1,J2)                                    02902230
LINE 224          WRITE( I6, MODEF2 )                                                  02902240
LINE 225          WRITE( I6, MODEF3 ) (I,(ETA(I,J),DETADX(I,J),J=J1,J2), I=IN1,IN2)    02902250
LINE 226          J1 = J1 & 3                                                          02902260
LINE 227    138   CONTINUE                                                             02902270
LINE 228    C                                                                          02902280
LINE 229          IN1 = IN2 & 1                                                        02902290
LINE 230    C                                                                          02902300
LINE 231    140   CONTINUE                                                             02902310
LINE 232          IF(JTYPE .NE.0)   GO  TO 200                                         02902320
LINE 233    C                                                                          02902330
LINE 234    C           CHECK TO SEE IF ALL SECTIONS HAVE BEEN READ AND ACCOUNTED FOR  02902340
LINE 235    C                                                                          02902350
LINE 236          DO 150 J=1,NWING                                                     02902360
LINE 237          NS = NSECT(J)                                                        02902370
LINE 238          DO 150 I=1,NS                                                        02902380
LINE 239          IF( NCHECK(I,J) .EQ. 0 ) GO TO 10                                    02902390
LINE 240     150  CONTINUE                                                             02902400
LINE 241    C                                                                          02902410
LINE 242    C     ------------------------------------------------------------------   02902420
```

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LINE 243  C                                                                    02902430
LINE 244  C          READ NEXT CARD, CHECK FOR RIGID MODE INPUT                02902440
LINE 245   200  READ( I5, 1000 ) LAB, JRIGID                                   02902450
LINE 246   210  CONTINUE                                                       02902460
LINE 247        IF( LAB .EQ. LEND )RETURN                                      02902470
LINE 248        IF( LAB .NE. LRIG ) GO TO 340                                  02902480
LINE 249   215  CONTINUE                                                       02902490
LINE 250  C          SECTION FOR RIGID MODES                                   02902500
LINE 251  C          CHECK THAT RIGID MODE NUMBER IS IN ORDER.                  02902510
LINE 252        JMODE = JMODE & 1                                              02902520
LINE 253        IF( JRIGID .NE. JMODE )    GO TO 350                           02902530
LINE 254  C        ZERO OUT ALL ETA AND DETADX FOR THAT MODE                    02902540
LINE 255        DO 220 I=1,NET                                                 02902550
LINE 256        ETA(I,JMODE) = 0.0                                             02902560
LINE 257        DETADX(I,JMODE) = 0.0                                          02902570
LINE 258    220 CONTINUE                                                       02902580
LINE 259        WRITE( I6, 2006 )                                              02902590
LINE 260        WRITE( I6, 2005 )                                              02902600
LINE 261        WRITE( I6, 2008 )                                              02902610
LINE 262        WRITE( I6, 2007 )                                              02902620
LINE 263        MODEF1(2) = NUMBR(1)                                           02902630
LINE 264        WRITE( I6, MODEF1 ) JMODE                                      02902640
LINE 265        MODEF2(5) = NUMBR(1)                                           02902650
LINE 266        MODEF3(3) = NUMBR(1)                                           02902660
LINE 267        WRITE( I6, MODEF2 )                                            02902670
LINE 268   230  CONTINUE                                                       02902680
LINE 269        READ( I5, 1001 ) LAB, IEL, ETA(IEL,JMODE), DETADX(IEL,JMODE)   02902690
LINE 270        IF( LAB .NE. LBLANK )  GO TO 240                               02902700
LINE 271        WRITE( I6, MODEF3 ) IEL, ETA(IEL,JMODE), DETADX(IEL,JMODE)     02902710
LINE 272        GO TO 230                                                      02902720
LINE 273   240  CONTINUE                                                       02902730
LINE 274        JRIGID = IEL / 100                                             02902740
LINE 275        GO TO 210                                                      02902750
LINE 276  C                                                                    02902760
LINE 277  C                                                                    02902770
LINE 278  C          ERROR SECTION                                             02902780
LINE 279  C                                                                    02902790
LINE 280   300  CONTINUE                                                       02902800
LINE 281  C          MDWI INPUT CARD NOT FOUND                                 02902810
LINE 282        WRITE( I6, 3000 )                                              02902820
LINE 283        WRITE( I6, 3001 )                                              02902830
LINE 284        ERROR = .TRUE.                                                 02902840
LINE 285        RETURN                                                         02902850
LINE 286   310  CONTINUE                                                       02902860
LINE 287  C          SECTION IS NOT DEFINED                                    02902870
LINE 288        WRITE( I6, 3000 )                                              02902880
LINE 289        WRITE( I6, 3002 )                                              02902890
LINE 290        WRITE( I6, 2002 ) NW, NI1                                      02902900
LINE 291        IF( NSI .GE. 2 ) WRITE( I6, 2002 )  NW, NI2                    02902910
LINE 292        IF( NSI .EQ. 3 ) WRITE( I6, 2002 )  NW, NI3                    02902920
LINE 293        ERROR = .TRUE.                                                 02902930
LINE 294        RETURN                                                         02902940
LINE 295   320  CONTINUE                                                       02902950
LINE 296  C          SECTIONS ARE NOT ADJACENT                                 02902960
LINE 297        WRITE( I6, 3000 )                                              02902970
LINE 298        WRITE( I6, 3003 ) NI1, NI2                                     02902980
LINE 299        ERROR = .TRUE.                                                 02902990
LINE 300        RETURN                                                         02903000
LINE 301   330  CONTINUE                                                       02903010
LINE 302  C          MODES NOT PRESENT FOR ALL SECTIONS                        02903020
LINE 303        WRITE( I6, 3000 )                                              02903030
LINE 304        WRITE( I6, 3004 )                                              02903040
```

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LINE 305    3004 FORMAT(50H MODAL DATA NOT PRESENT FOR THE FOLLOWING SECTIONS  )    02903050
LINE 306         DO 332 J=1,NWING                                                  02903060
LINE 307         NS = NSECT(J)                                                     02903070
LINE 308         DO 332 I=1,NS                                                     02903080
LINE 309         IF( NCHECK(I,J) .EQ. 0 ) WRITE( I6, 2002 ) J, I                   02903090
LINE 310    332  CONTINUE                                                         02903100
LINE 311         ERROR = .TRUE.                                                    02903110
LINE 312         RETURN                                                            02903120
LINE 313    C                                                                      02903130
LINE 314    340  CONTINUE                                                         02903140
LINE 315         WRITE( I6, 3000 )                                                 02903150
LINE 316         WRITE( I6, 3005 ) LAB                                             02903160
LINE 317         ERROR = .TRUE.                                                    02903170
LINE 318         RETURN                                                            02903180
LINE 319    C                                                                      02903190
LINE 320    350  CONTINUE                                                         02903200
LINE 321         WRITE( I6, 3000 )                                                 02903210
LINE 322         WRITE( I6, 3006 ) JMODE, JRIGID                                   02903220
LINE 323         ERROR = .TRUE.                                                    02903230
LINE 324         RETURN                                                            02903240
LINE 325     400 FORMAT ( 1HO// 50X,   1I4,  25H MODE FUNCTION EQUATIONS   /       02903250
LINE 326        1 4X, 8HEQUATION ,2X,4X, 4HWING, 2X,4X, 4HMODE,4X,20X,            02903260
LINE 327        2   12HCOEFFICIENTS /36X,8HCONSTANT ,  2X, 8X, 1HX, 5X, 8X,1HY, 5X,02903270
LINE 328        4  6X, 2HXY,6X ,                                                   02903280
LINE 329        3 3X,8HX SQUARE   , 3X, 3X,8HY SQUARE    )                       02903290
LINE 330    405  FORMAT( 6X, 3I2, 12X, 8E6.6 )                                    02903300
LINE 331    410  FORMAT (1HO,8X,1I2,4X,4X,1I2, 4X,4X,I2,2X,(6E14.4))               02903310
LINE 332    1000 FORMAT( A4, 2X, 4I2 )                                            02903320
LINE 333    1001 FORMAT( A4, 2X, I4, 14X, 2E12.0 )                                02903330
LINE 334    1006 FORMAT ( 20A4 )                                                  02903340
LINE 335    1016 FORMAT( 1X, 20A4 )                                               02903350
LINE 336    2001 FORMAT( 1H1// 24X,16HINPUT MODAL DATA // )                       02903360
LINE 337    2002 FORMAT(  20X,  4HWING, I2, 10H   SECTION, I2 )                   02903370
LINE 338    2003 FORMAT( // 20X,10HECHO CHECK  )                                  02903380
LINE 339    2004 FORMAT(  I1, 19X, 20HGENERATED MODAL DATA // )                   02903390
LINE 340    2005 FORMAT( //20X,16HAERODYNAMIC GRID/)                              02903400
LINE 341    2006 FORMAT(1H1,///  20X, 21HRIGID BODY MODE INPUT )                   02903410
LINE 342    2007 FORMAT( // 20X, 55HONLY ELEMENTS WITH A NON-ZERO MODAL VALUE MUST 02903420
LINE 343        1BE INPUT )                                                       02903430
LINE 344    2008 FORMAT(                              20X,  30HSTRUCTURAL REFERENCE SYS02903440
LINE 345        1TEM OR  /  20X, 35HROTATED STRUCTURAL REFERENCE SYSTEM  /  )     02903450
LINE 346    2009 FORMAT (// 20X, 44HMODAL DATA INPUT IS GENERATED BY POLYNOMIAL  , 02903460
LINE 347        115HDEFINED BY USER )                                             02903470
LINE 348    2010 FORMAT( 1H1 )                                                    02903480
LINE 349    C                                                                     02903490
LINE 350    3000 FORMAT( /// 1X, 120(1H*) // 29H ERROR IN READING MODE INPUT. / ) 02903500
LINE 351    3001 FORMAT(  46H 'MDWING' DATA CARD IS EXPECTED BUT NOT FOUND. /     02903510
LINE 352        1 51H THIS CARD MUST PRECEDE EACH MODE DATA INPUT GROUP.  /       02903520
LINE 353        2105H THIS CARD MUST FOLLOW THE 'MODE' DATA CARD OR THE LAST DATA C02903530
LINE 354        3ARD OF THE PRECEDING MODE DATA INPUT GROUP. / )                  02903540
LINE 355    3002 FORMAT(76H 'MDWING' DATA CARD SPECIFIES INPUT FOR A SECTION THAT H02903550
LINE 356        1AS NOT BEEN DEFINED. /   19H SECTIONS SPECIFIED   )              02903560
LINE 357    3003 FORMAT( 64H 'MDWING' DATA CARD SPECIFIES TWO SECTIONS THAT ARE NOT02903570
LINE 358        1ADJACENT.  /  8H SECTION, I3,12H AND SECTION, I3 )               02903580
LINE 359    3005 FORMAT( /  90H A LABEL DATA CARD FOLLOWING FLEXABLE MODE DATA INPU02903590
LINE 360        1T IS EITHER OUT OF ORDER OR INCORRECT. / 68H THE FIRST FOUR CHARAC02903600
LINE 361        2TERS OF THE CARD FOLLOW WITHIN PARENTHESES.  (,  A4, 1H)  )      02903610
LINE 362    3006 FORMAT( /  35H RIGID MODE NUMBER IS NOT IN ORDER. / 24H MODE NUMBE02903620
LINE 363        1R EXPECTED IS,  I4  / 21H MODE NUMBER INPUT IS, I4 )             02903630
LINE 364    C                                                                     02903640
LINE 365         END                                                              02903650
```

```
DISPLAY...FILE          DECK 30

LINE    1          SUBROUTINE READAB(Z, A)                                    03000010
LINE    2              INTEGER HEADER(20)                                     03000020
LINE    3          DIMENSION  Z(1),A(1)                                       03000030
LINE    4          COMMON / ZFDZIO /  I5, I6                                  03000040
LINE    5          COMMON  /ZFUNNY/  N,IERF,B1,B2, B3,NFUNMX                  03000050
LINE    6          COMMON /XYSCAL / XX, YY, XO, YC, BREF, ZZZ, ITEST          03000060
LINE    7  C                                                                  03000070
LINE    8  C                                                                  03000080
LINE    9  C  INITIALIZATION ENTRY POINT (COEFFICIENTS).                      03000090
LINE   10          READ( I5, 11 ) HEADER                                      03000100
LINE   11          WRITE( I6, 11 ) HEADER                                     03000110
LINE   12          READ( I5, 13 )  ( Z(I), I=1,N )                            03000120
LINE   13          WRITE( I6, 12 ) (Z(I), I=1,N)                              03000130
LINE   14          ITEST = 0                                                  03000140
LINE   15          ZZZ = Z(1)                                                 03000150
LINE   16          DO 5 I=2, N                                                03000160
LINE   17          IF ( Z(I) .NE. ZZZ ) GO TO 7                               03000170
LINE   18      5   CONTINUE                                                   03000180
LINE   19          ITEST = 1                                                  03000190
LINE   20      7   CONTINUE                                                   03000200
LINE   21          READ( I5, 11 ) HEADER                                      03000210
LINE   22          WRITE( I6, 11 ) HEADER                                     03000220
LINE   23          READ( I5, 13 )  ( A(I), I=1,N )                            03000230
LINE   24          WRITE( I6, 12 ) (A(I), I=1,N)                              03000240
LINE   25          READ( I5, 11 ) HEADER                                      03000250
LINE   26          WRITE( I6, 11 ) HEADER                                     03000260
LINE   27          READ( I5, 13 )  B1, B2, B3                                 03000270
LINE   28          WRITE( I6, 12 ) B1,B2,B3                                   03000280
LINE   29           RETURN                                                    03000290
LINE   30     11       FORMAT(20A4)                                           03000300
LINE   31     12       FORMAT( 1P5E15.7)                                      03000310
LINE   32     13   FORMAT(  5E15.7  )                                         03000320
LINE   33           END                                                       03000330
```

DISPLAY...FILE DECK 31

```
LINE    1          SUBROUTINE READXY(X,Y)                                  03100010
LINE    2              INTEGER HEADER(20)                                  03100020
LINE    3          DIMENSION  X(1), Y(1)                                   03100030
LINE    4          COMMON / ZFDZIO /  I5, I6                               03100040
LINE    5          COMMON /ZFUNNY/ N,IERF,B1,B2,B3,NFUNMX                  03100050
LINE    6  C                                                               03100060
LINE    7  C  INITIALIZATION ENTRY POINT (ABSCISSAS).                      03100070
LINE    8  C  USAGE    CALL READ NXY                                       03100080
LINE    9          READ( I5, 10 ) N                                        03100090
LINE   10          WRITE( I6, 10 ) N                                       03100100
LINE   11          READ( I5, 11 ) HEADER                                   03100110
LINE   12          WRITE( I6, 11 ) HEADER                                  03100120
LINE   13          IERF =0                                                 03100130
LINE   14          IF (N.GT. NFUNMX)    IERF=680                           03100140
LINE   15          IF (N.GT. NFUNMX)    RETURN                             03100150
LINE   16          READ( I5, 13 )  ( X(I), I=1,N )                         03100160
LINE   17          WRITE( I6, 12 ) (X(I), I=1,N)                           03100170
LINE   18          READ( I5, 11 ) HEADER                                   03100180
LINE   19          WRITE( I6, 11 ) HEADER                                  03100190
LINE   20          READ( I5, 13 )  ( Y(I), I=1,N )                         03100200
LINE   21          WRITE( I6, 12 ) (Y(I), I=1,N)                           03100210
LINE   22           RETURN                                                 03100220
LINE   23       10 FORMAT( 5X, 3HN = ,I3)                                  03100230
LINE   24       11     FORMAT(20A4)                                        03100240
LINE   25       12     FORMAT( 1P5E15.7)                                   03100250
LINE   26       13  FORMAT(  5E15.7  )                                     03100260
LINE   27          END                                                     03100270
```

DISPLAY...FILE DECK 32

```
LINE    1        SUBROUTINE RSTART ( MACH, NET, NFREQ, FREQ, REFLEN, IWTE, I8, I15,03200010
LINE    2       1          I6, FREQR, XYZ, AREA )                                  03200020
LINE    3        LOGICAL ERROR                                                     03200030
LINE    4        REAL MACH, MACHR                                                  03200040
LINE    5        DIMENSION FREQ(1), FREQR(1),      AREA(1), XYZ(1)                 03200050
LINE    6        COMMON / NEXTCS /  IFLUSH                                         03200060
LINE    7        ERROR = .FALSE.                                                   03200070
LINE    8        IS = I8                                                           03200080
LINE    9   10   CONTINUE                                                          03200090
LINE   10        REWIND IS                                                         03200100
LINE   11        READ(IS) MACHR, NETR, RRFL, IWTER, NFREQR, (FREQR(I),I=1,NFREQR)  03200110
LINE   12        IF( MACHR  .NE. MACH  ) GO TO 90                                  03200120
LINE   13        IF( NETR   .NE. NET   ) GO TO 90                                  03200130
LINE   14        IF( NFREQR .NE. NFREQ ) GO TO 90                                  03200140
LINE   15        IF( REFLEN .NE. RRFL  ) GO TO 90                                  03200150
LINE   16        IF( IWTE .NE. 0  .AND.  IWTER .EQ. 0 )     GO TO 90               03200160
LINE   17        DO 15  I=1,NFREQ                                                  03200170
LINE   18        IF( FREQR(I) .NE. FREQ(I) ) GO TO 90                              03200180
LINE   19   15   CONTINUE                                                          03200190
LINE   20        IF( IWTE .EQ. 0 ) GO TO 30                                        03200200
LINE   21        IF( IS .EQ. I15 ) GO TO 30                                        03200210
LINE   22        IS = I15                                                          03200220
LINE   23        GO TO 10                                                          03200230
LINE   24    30  CONTINUE                                                          03200240
LINE   25        IF( ERROR ) GO TO 99                                              03200250
LINE   26  C          RESTART TAPE(S) HAVE BEEN READ AND FOUND TO BE CORRECT       03200260
LINE   27  C          FIND AREA                                                    03200270
LINE   28        INDXR = 1                                                         03200280
LINE   29        DO  50  IRC = 1, NET                                              03200290
LINE   30        DSX = 0.5*(XYZ(INDXR&5)-XYZ(INDXR&4))                             03200300
LINE   31        AREA(IRC)=DSX*(XYZ(INDXR&3)-XYZ(INDXR) &XYZ(INDXR&2)-XYZ(INDXR&1))03200310
LINE   32        INDXR = INDXR & 6                                                 03200320
LINE   33    50  CONTINUE                                                          03200330
LINE   34        RETURN                                                            03200340
LINE   35    90  CONTINUE                                                          03200350
LINE   36  C          ERROR IN RESTART TAPE                                        03200360
LINE   37        ERROR = .TRUE.                                                    03200370
LINE   38        WRITE( I6, 2000 ) IS                                              03200380
LINE   39        WRITE( I6, 2001 )                                                 03200390
LINE   40        WRITE( I6, 2002 ) MACH, MACHR, NET, NETR, REFLEN, RRFL, IWTE,     03200400
LINE   41       1     IWTER, NFREQ, NFREQR, ( I, FREQ(I), FREQR(I),I=1,NFREQ)     03200410
LINE   42        IF( IWTE .EQ. 0 ) GO TO 99                                        03200420
LINE   43        IF( IS .EQ. I15 ) GO TO 99                                        03200430
LINE   44        IS = I15                                                          03200440
LINE   45        GO TO 10                                                          03200450
LINE   46    99  CONTINUE                                                          03200460
LINE   47        IFLUSH = 1                                                        03200470
LINE   48        RETURN                                                            03200480
LINE   49   2000 FORMAT(1H1/ 60(2H *) //38H ERROR IN READING RESTART TAPE ON UNIT  03200490
LINE   50       1  I4 )                                                           03200500
LINE   51   2001 FORMAT( /48H RESTART TAPE DID NOT CORRESPOND TO CURRENT RUN.     03200510
LINE   52       1 67H FOLLOWING IS A COMPARISON OF THE CURRENT RUN AND THE RESTART 03200520
LINE   53       2TAPE. /// 41X, 11HCURRENT RUN, 9X, 12HRESTART TAPE   )           03200530
LINE   54   2002 FORMAT( / 11X, 24HMACH NUMBER                 ,   E17.5, E21.5  03200540
LINE   55       1  / 11X,       24HTOTAL NUMBER OF ELEMENTS,     I17,   I21       03200550
LINE   56       2  / 11X,       24HREFERENCE LENGTH         ,    E17.5, E21.5     03200560
```

```
LINE   57       3  / 11X,       24HWAKE EFFECT CODE          ,   I17,   I21          03200570
LINE   58       4  / 11X,       24HNUMBER OF FREQUENCIES     ,   I17,   I21          03200580
LINE   59       5  /   (   11X, 10HFREQUENCY(, I2, 1H), 11X,   E17.5, E21.5 )   )   03200590
LINE   60        END                                                                 03200600
```

```
DISPLAY...FILE          DECK 33

LINE    1          SUBROUTINE RTOI( TR, TI, YCR, ZCR, ZRO, ZLO )                    03300010
LINE    2  C                                                                        03300020
LINE    3  C           RTOI TRANSFROMS YCR AND ZCR FROM THE RECEIVING SYSTEM TO THE  03300030
LINE    4  C           INFTUENCING SYSTEM. YCR, ZCR ARE FIRT PUT IN REFERENC SYSTEM  03300040
LINE    5  C           BY PREMULTIPLING BY TR. THIS IS Y,Z WHICH IS PUT IN INFLUENC- 03300050
LINE    6  C           ING SYSTEM YC,ZC BY PREMULT. BY THE TRANSPOSE OF TI           03300060
LINE    7  C                                                                        03300070
LINE    8          DIMENSION TR(1), TI(1)                                           03300080
LINE    9          COMMON / RRLL / TVW(4), YRO, YLO, ZR, ZRZR, ZL, ZLZL             03300090
LINE   10          Y = TR(1)*YCR & TR(3)*ZCR                                        03300100
LINE   11          Z = TR(2)*YCR & TR(4)*ZCR                                        03300110
LINE   12          YRO = TI(1)*Y & TI(2)*Z                                          03300120
LINE   13          ZRO = TI(3)*Y & TI(4)*Z                                          03300130
LINE   14          YLO = -TI(1)*Y & TI(2)*Z                                         03300140
LINE   15          ZLO = TI(3)*Y - TI(4)*Z                                          03300150
LINE   16          TVW(1) = TR(3)*TI(1) & TR(4)*TI(2)                               03300160
LINE   17          TVW(2) = TR(3)*TI(3) & TR(4)*TI(4)                               03300170
LINE   18          TVW(3) = -TR(3)*TI(1) & TR(4)*TI(2)                              03300180
LINE   19          TVW(4) =  TR(3)*TI(3) - TR(4)*TI(4)                              03300190
LINE   20          RETURN                                                           03300200
LINE   21          END                                                              03300210

END READ

END OF JOB.

    33.2 SEC. USED     .010 HRS. CHARGED   49.952 HRS. REMAINING
```

DISPLAY...FILE DECK 34

```
LINE    1        SUBROUTINE SOLVE (N,NDIM,A,B,IP)                                03400010
LINE    2  C                                                                     03400020
LINE    3  C     SUBROUTINE SOLVE                                                03400030
LINE    4  C                                                                     03400040
LINE    5  C     PURPOSE                                                         03400050
LINE    6  C        SOLUTION OF THE LINEAR SYSTEM OF EQUATIONS C*X = B.          03400060
LINE    7  C                                                                     03400070
LINE    8  C     USAGE                                                           03400080
LINE    9  C        CALL SOLVE(N,NDIM,A,B,IP)                                    03400090
LINE   10  C                                                                     03400100
LINE   11  C     DESCRIPTION OF PARAMETERS                                       03400110
LINE   12  C        N    - ORDER OF THE MATRIX A                                 03400120
LINE   13  C        NDIM- FIRST DIMENSION OF A DECLARED IN CALLING PROGRAM. IF A IS03400130
LINE   14  C              SINGLY SUBSCRIPTED IN CALLING PROGRAM, SET NDIM=N.      03400140
LINE   15  C        A    -CONTAINS THE TRIANGULAR FACTORS OF THE MATRIX C (AS     03400150
LINE   16  C              DETERMINED BY SUBROUTINE 'DECOM').                     03400160
LINE   17  C        B    -ON INPUT, THE RHS VECTOR, ON OUTPUT, THE SOLUTION VECTOR. 03400170
LINE   18  C        IP   -VECTOR OF DIMENSION N CONTAINING ROW INTERCHANGE       03400180
LINE   19  C              INFORMATION (AS DETERMINED BY SUBROUTINE 'DECOM').     03400190
LINE   20  C                                                                     03400200
LINE   21  C     REMARKS                                                         03400210
LINE   22  C        'SOLVE' MUST BE USED IN CONJUNCTION WITH SUBROUTINE 'DECOM'. 03400220
LINE   23  C                                                                     03400230
LINE   24  C     SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED.                  03400240
LINE   25  C        NONE                                                         03400250
LINE   26  C                                                                     03400260
LINE   27  C     METHOD                                                          03400270
LINE   28  C        BACK SUBSTITUTION BASED ON THE FACTORED FORM OF THE COEFFICIENT03400280
LINE   29  C        MATRIX.  SEE ALGORITHM 423, 'COLLECTED ALGORITHMS FROM CACM', 03400290
LINE   30  C        BY CLEVE MOLER.                                              03400300
LINE   31  C                                                                     03400310
LINE   32        DIMENSION A(NDIM,1),B(1),IP(1)                                  03400320
LINE   33        IF (N .EQ. 1) GO TO 9                                           03400330
LINE   34        NM1 = N-1                                                       03400340
LINE   35        DO 7 K = 1,NM1                                                  03400350
LINE   36          KP1 = K&1                                                     03400360
LINE   37          M = IP(K)                                                     03400370
LINE   38        T = B(M)                                                        03400380
LINE   39        B(M) = B(K)                                                     03400390
LINE   40        B(K) = T                                                        03400400
LINE   41        DO 7 I = KP1,N                                                  03400410
LINE   42      7 B(I) = B(I) & A(I,K)*T                                          03400420
LINE   43        DO 8 KB = 1,NM1                                                 03400430
LINE   44        KM1 = N - KB                                                    03400440
LINE   45        K = KM1 & 1                                                     03400450
LINE   46        B(K) = B(K)/A(K,K)                                              03400460
LINE   47        T = -B(K)                                                       03400470
LINE   48        DO 8 I = 1,KM1                                                  03400480
LINE   49      8 B(I) = B(I) & A(I,K)*T                                          03400490
LINE   50      9 B(1) = B(1)/A(1,1)                                              03400500
LINE   51        RETURN                                                          03400510
LINE   52        END                                                             03400520
```

DISPLAY...FILE DECK 35

```
LINE    1       SUBROUTINE SONS( NWING, NSECT, CORNX, CORNY, CORNZ, ISONS )          03500010
LINE    2  C                                                                         03500020
LINE    3  C        SUBROUTINE SONS DETERMINES BOOLEAN MATRIX ISONS                  03500030
LINE    4  C        ISONS(K1,K2) = 1  IF SECTION K2 HAS INFLUENCE ON REC. SECT. K1   03500040
LINE    5  C                     = 0  IF K2 DOES NOT INFLUENCE K1                    03500050
LINE    6  C        K1 IS RECEVING SECTION NUMBER,  K2 IS INFLUENCING SECTION NUM.   03500060
LINE    7  C                                                                         03500070
LINE    8       DIMENSION NSECT(1), CORNX(8,4),CORNY(8,4),CORNZ(8,4), ISONS(12,12)   03500080
LINE    9  C        LOOP ON RECEIVING SECTIONS ( DO 30 AND DO 25 )                   03500090
LINE   10       K1 = 0                                                               03500100
LINE   11  C                                                                         03500110
LINE   12       DO 30 J=1,NWING                                                      03500120
LINE   13       NS1 = NSECT(J)                                                       03500130
LINE   14       DO 25 I=1,NS1                                                        03500140
LINE   15  C                                                                         03500150
LINE   16       K1 = K1 & 1                                                          03500160
LINE   17       JCN1 = 2*I - 2                                                       03500170
LINE   18  C        LOOP ON SECTIONS WHICH MAY HAVE INFLUENCE ( DO 20 AND DO 15 )    03500180
LINE   19       K2 = 0                                                               03500190
LINE   20  C                                                                         03500200
LINE   21       DO 20  JJ=1,NWING                                                    03500210
LINE   22       NS2 = NSECT(JJ)                                                      03500220
LINE   23       DO 15  II=1,NS2                                                      03500230
LINE   24  C                                                                         03500240
LINE   25       K2 = K2 & 1                                                          03500250
LINE   26       ISONS(K1,K2) = 1                                                     03500260
LINE   27  C      A SECTION ALWAYS INFLUENCES ITSELF AND ADJACENT SECTIONS           03500270
LINE   28       IF( J .EQ. JJ  .AND.  IABS(I-II) .LE. 1 ) GO TO 15                   03500280
LINE   29       JCN2 = 2*II - 1                                                      03500290
LINE   30  C        LOOP ON BOTTOM CORNER POINTS OF RECEIVING SECTION (PTS 2, 4 )     03500300
LINE   31  C        IF LOOP (DO 10) IS COMPLETED, SECTION DOES NOT INFLUENCE         03500310
LINE   32  C                                                                         03500320
LINE   33       DO 10  I2 = 2,4,2                                                    03500330
LINE   34  C                                                                         03500340
LINE   35       IND1 = JCN1 & I2                                                     03500350
LINE   36       XC = CORNX(IND1,J)                                                   03500360
LINE   37       YC = CORNY(IND1,J)                                                   03500370
LINE   38       ZC = CORNZ(IND1,J)                                                   03500380
LINE   39  C        LOOK AT TOP CORNER PTS. OF INFLUENCING SECTION (PTS 1 AND 3)     03500390
LINE   40       IND1 = JCN2 & 2                                                      03500400
LINE   41       X1 = CORNX(JCN2,JJ)                                                  03500410
LINE   42       X3 = CORNX(IND1,JJ)                                                  03500420
LINE   43       IF( XC .LT. X1  .AND. XC .LT. X3 ) GO TO 10                          03500430
LINE   44       Y1 = CORNY(JCN2,JJ)                                                  03500440
LINE   45       Y3 = CORNY(IND1,JJ)                                                  03500450
LINE   46       Z1 = CORNZ(JCN2,JJ)                                                  03500460
LINE   47       Z3 = CORNZ(IND1,JJ)                                                  03500470
LINE   48       YCY1 = YC - Y1                                                       03500480
LINE   49       Y3YC = Y3 - YC                                                       03500490
LINE   50       IF( Y1 .EQ. Y3 ) GO TO 8                                             03500500
LINE   51       IF( YCY1*Y3YC .LE. 0.0 ) GO TO 8                                     03500510
LINE   52  C        YC IS BETWEEN Y1 AND Y3, CHECK INTERSECTION                       03500520
LINE   53       A = YCY1/(Y1-Y3)                                                     03500530
LINE   54       X = X1 - A*(X3-X1)                                                   03500540
LINE   55       Z = Z1 - A*(Z3-Z1)                                                   03500550
LINE   56       R = XC - X & Z - ZC                                                  03500560
```

```
LINE   57  C          IF R GT 0, SECTION HAS INFLUENCE SO BRANCH OUT OF DO 10 LOOP   03500570
LINE   58          IF( R .GT. 0.0 ) GO TO 15                                        03500580
LINE   59          GO TO 10                                                         03500590
LINE   60     8    CONTINUE                                                         03500600
LINE   61  C          YC IS OUTSIDE OF Y1,Y3  CHECK BOTH POINTS                     03500610
LINE   62  C                                                                        03500620
LINE   63          ZHI = XC - X1                                                    03500630
LINE   64          ETA = YC - Y1                                                    03500640
LINE   65          ZO  = ZC - Z1                                                    03500650
LINE   66          T = SQRT( ETA*ETA  &  ZO*ZO )                                    03500660
LINE   67          R = ZHI - T                                                      03500670
LINE   68  C          IF R GT 0, SECTION HAS INFLUENCE SO BRANCH OUT OF DO 10 LOOP   03500680
LINE   69          IF( R .GT. 0.0 ) GO TO 15                                        03500690
LINE   70  C                                                                        03500700
LINE   71          ZHI = XC - X3                                                    03500710
LINE   72          ETA = YC - Y3                                                    03500720
LINE   73          ZO  = ZC - Z3                                                    03500730
LINE   74          T = SQRT( ETA*ETA  &  ZO*ZO )                                    03500740
LINE   75          R = ZHI - T                                                      03500750
LINE   76  C          IF R GT 0, SECTION HAS INFLUENCE SO BRANCH OUT OF DO 10 LOOP   03500760
LINE   77          IF( R .GT. 0.0 ) GO TO 15                                        03500770
LINE   78  C                                                                        03500780
LINE   79    10    CONTINUE                                                         03500790
LINE   80  C          WE DID NOT BRANCH OUT OF DO 10 LOOP                           03500800
LINE   81  C          SECTION K2 DOES NOT INFLUENCE SECTION K1                      03500810
LINE   82          ISONS(K1,K2) = 0                                                 03500820
LINE   83  C                                                                        03500830
LINE   84  C               END LOOP ON INFLUENCING SECTION (15) AND WING (20)       03500840
LINE   85     15   CONTINUE                                                         03500850
LINE   86     20   CONTINUE                                                         03500860
LINE   87  C                                                                        03500870
LINE   88  C               END LOOP ON RECEIVING SECTION (25) AND WING (30)         03500880
LINE   89     25   CONTINUE                                                         03500890
LINE   90     30   CONTINUE                                                         03500900
LINE   91  C                                                                        03500910
LINE   92          RETURN                                                           03500920
LINE   93          END                                                              03500930
```

DISPLAY...FILE DECK 36

```
LINE    1          SUBROUTINE SONSPT( ISONS, NWING, NSECT, MACH, I6 )                    03600010
LINE    2  C            SONSPT PRINTS SECTION INFLUENCE TABLE                            03600020
LINE    3          REAL MACH                                                             03600030
LINE    4          DIMENSION IFT1( 9), IFT2( 9), IF(15)                                  03600040
LINE    5          DIMENSION ISONS(12,12), NSECT(1), IW(15), IS(15)                      03600050
LINE    6  C                                                                             03600060
LINE    7          DATA IFT1 /  4H(11H, 4H REC, 4HEIVI, 4HNG ,, 1H , 4H(6H ,             03600070
LINE    8         1  4H WIN, 4HG,I2, 2H)) /                                             03600080
LINE    9          DATA IF / 1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9,2H10,2H11,2H12,2H13,   03600090
LINE   10         1 2H14, 2H15 /                                                        03600100
LINE   11          DATA IFT2 /  4H(11H, 4H SEC, 4HTION, 4HS  ,, 1H , 4H(6H ,            03600110
LINE   12         1  4H SEC, 4HT,I2, 2H)) /                                            03600120
LINE   13  C                                                                           03600130
LINE   14          WRITE( I6, 1001 )  MACH                                             03600140
LINE   15          WRITE( I6, 1002 )                                                   03600150
LINE   16          K = 0                                                               03600160
LINE   17          DO 10 J=1,NWING                                                     03600170
LINE   18          NS= NSECT(J)                                                        03600180
LINE   19          DO  5 I=1,NS                                                        03600190
LINE   20          K = K & 1                                                           03600200
LINE   21          IW(K) = J                                                           03600210
LINE   22          IS(K) = I                                                           03600220
LINE   23   5      CONTINUE                                                            03600230
LINE   24   10     CONTINUE                                                            03600240
LINE   25          IFT1(5) = IF(K)                                                     03600250
LINE   26          IFT2(5) = IF(K)                                                     03600260
LINE   27          WRITE( I6, IFT1 )(IW(I),I=1,K)                                      03600270
LINE   28          WRITE( I6, IFT2 ) (IS(I), I=1,K)                                    03600280
LINE   29          DO 20  I=1,K                                                        03600290
LINE   30          WRITE( I6, 1003 ) IW(I), IS(I), ( ISONS(I,J), J=1,K )               03600300
LINE   31   20     CONTINUE                                                            03600310
LINE   32   1001 FORMAT( 1H1 / 40X,45HTABLE OF INFLUENCING SECTIONS FOR MACH NUMBER   03600320
LINE   33         1       ,F8.4  )                                                     03600330
LINE   34   1002 FORMAT( //2X,50HKEY  0  ALL ELEMENTS OF INFLUENCING SECTION HAVE Z   03600340
LINE   35         1,  50HERO INFLUENCE ON ALL ELEMENTS OF RECEIVING SECTION //        03600350
LINE   36         2 7X,  32H1  NON-ZERO INFLUENCE IS ASSUMED ///                      03600360
LINE   37         3 13X, 20HINFLUENCING SECTIONS   )                                  03600370
LINE   38   1003 FORMAT( / 5H WING, I2  /  5H SECT, I2, 4X, 15I8  )                   03600380
LINE   39          RETURN                                                              03600390
LINE   40          END                                                                 03600400
```

DISPLAY...FILE DECK 37

```
LINE  1      SUBROUTINE SYMBOL(X,Y,SIZE,CHAR,ANG,NCHAR)                    03700010
LINE  2      DIMENSION CHAR(3)                                             03700020
LINE  3      CALL NOTATE(X,Y,SIZE,CHAR,ANG,NCHAR)                          03700030
LINE  4      RETURN                                                        03700040
LINE  5      END                                                           03700050
```

DISPLAY...FILE DECK 38

```
LINE    1          SUBROUTINE TIMOUT(MSEC,A,B,C,D,E,F,G,H)                    03800010
LINE    2          COMMON   /TAPE/ I9,I10,I11,I12,I13,I14,J9                  03800020
LINE    3          DATA TI / 0.0 /                                            03800030
LINE    4          T = MSEC                                                   03800040
LINE    5          T = T/1000.                                                03800050
LINE    6          TI = T - TI                                                03800060
LINE    7          WRITE(J9,3001)A,B,C,D,E,F,G,H,TI,T                         03800070
LINE    8          TI = T                                                     03800080
LINE    9          RETURN                                                     03800090
LINE   10    3001 FORMAT( 6X, 8A4,  5X, F8.3, 13X, F8.3 )                     03800100
LINE   11          END                                                        03800110
```

```
CISPLAY...FILE          DECK 39

LINE    1          SUBROUTINE TMAX(NET, A, GBAR)                          03900010
LINE    2          DIMENSION   A(1)                                        03900020
LINE    3          DATA  EPS  / .0000001/                                 03900030
LINE    4          GBAR  =0.0                                             03900040
LINE    5          DO 480       IEL=1,NET                                 03900050
LINE    6          G =  ABS(A(IEL))                                       03900060
LINE    7          IF(G.GT. GBAR  )     GBAR = G                          03900070
LINE    8    480   CONTINUE                                               03900080
LINE    9          IF(GBAR .EQ.0.0)  GO TO 600                            03900090
LINE   10          DO 580              IEL = 1,NET                        03900100
LINE   11          G = EPS * GBAR                                         03900110
LINE   12          G = ABS( G)                                            03900120
LINE   13          AIEL = ABS (A(IEL) )                                   03900130
LINE   14          IF (G .GT. AIEL)       A(IEL) =0.0                     03900140
LINE   15    580   CONTINUE                                               03900150
LINE   16    600   RETURN                                                 03900160
LINE   17          END                                                    03900170
```

DISPLAY...FILE DECK 40

```
LINE    1        SUBROUTINE TRANS( X, Y, Z, T, XP, YP,  ZC )                                    04000010
LINE    2        DIMENSION X(1), Y(1), Z(1), T(4), XP(1), YP(1)                                 04000020
LINE    3        T1X = X(4) - X(1)                                                              04000030
LINE    4        T1Y = Y(4) - Y(1)                                                              04000040
LINE    5        T1Z = Z(4) - Z(1)                                                              04000050
LINE    6        T2X = X(3) - X(2)                                                              04000060
LINE    7        T2Y = Y(3) - Y(2)                                                              04000070
LINE    8        T2Z = Z(3) - Z(2)                                                              04000080
LINE    9        XN = T1Y*T2Z - T1Z*T2Y                                                         04000090
LINE   10        YN = T1Z*T2X - T1X*T2Z                                                         04000100
LINE   11        ZN = T1X*T2Y - T1Y*T2X                                                         04000110
LINE   12        XYZN = XN*XN & YN*YN & ZN*ZN                                                   04000120
LINE   13        XYZN = SQRT(XYZN)                                                              04000130
LINE   14        XN = XN/XYZN                                                                   04000140
LINE   15        YN = YN/XYZN                                                                   04000150
LINE   16        ZN = ZN/XYZN                                                                   04000160
LINE   17  C                                                                                    04000170
LINE   18        T(1) = ZN                                                                      04000180
LINE   19        T(2) = -YN                                                                     04000190
LINE   20        T(3) = YN                                                                      04000200
LINE   21        T(4) = ZN                                                                      04000210
LINE   22  C                                                                                    04000220
LINE   23        IT = 0                                                                         04000230
LINE   24        ZC = YN*Y(1) & ZN*Z(1)                                                         04000240
LINE   25        ZX = ZC                                                                        04000250
LINE   26        IF( ABS(ZC) .LT. 1.E-10 ) ZX = 1.0                                             04000260
LINE   27        DO 10  I=1,4                                                                   04000270
LINE   28        XP(I) = X(I)                                                                   04000280
LINE   29        YP(I) = ZN*Y(I) - YN*Z(I)                                                      04000290
LINE   30  C          FOLLOWING CALCULATION FOR DEBUG                                           04000300
LINE   31  C      Z1     = YN*Y(I) & ZN*Z(I)                                                    04000310
LINE   32  C      IF( ABS(ZC-Z1)/ZX .GT. 0.001 ) IT = 1                                          04000320
LINE   33    10   CONTINUE                                                                      04000330
LINE   34  C      WRITE( 6,1001 ) ( X(I),XP(I), Y(I),YP(I), Z(I),Z1    ,I=1,4)                   04000340
LINE   35  C      WRITE( 6,1002 ) T                                                              04000350
LINE   36  C      IF( IT .EQ. 1 ) GO TO 20                                                       04000360
LINE   37         RETURN                                                                         04000370
LINE   38  C20    CONTINUE                                                                       04000380
LINE   39  C      WRITE( 6, 1003 )                                                               04000390
LINE   40  C1003 FORMAT(/1X,120(1H*)//79H ERROR IN TRANS - ALL Z'S ARE NOT IDENTICA04000400
LINE   41  C     1L FOR A SECTION. PROCEED WITH CAUTION  // 1X, 120(1H*) /// )                   04000410
LINE   42  C      RETURN                                                                         04000420
LINE   43  C1001 FORMAT( //  3(2E14.4,2X) )                                                     04000430
LINE   44  C1002 FORMAT( // (2E14.4 ))                                                          04000440
LINE   45         END                                                                            04000450
```

DISPLAY...FILE DECK 41

```
LINE    1        SUBROUTINE WAKET(I12,AROW,WROW, IF ,LRECLW,NSPT, I8 , IZ,K1,NNCH  04100010
LINE    2       1,FRQ,K)                                                           04100020
LINE    3        COMPLEX WTES                                                      04100030
LINE    4        COMPLEX  AROW(NSPT), WROW(LRECLW)                                 04100040
LINE    5        COMPLEX   AROWJ                                                   04100050
LINE    6        LOGICAL TREDGE,WAKE1,WAKE,WAKENZ                                  04100060
LINE    7        DIMENSION  IZ(NSPT)                                               04100070
LINE    8        DIMENSION  NNCH(NSPT)                                             04100080
LINE    9        COMMON /FQ1/ NFREQ                                                04100090
LINE   10        COMMON /K1112/ KST11,KST12                                        04100100
LINE   11        COMMON/WAKEUP/ WTES(12), TREDGE,WAKE1,WAKE, WAKENZ, KWAKE         04100110
LINE   12        IF(K1.EQ.K)  GO TO 60                                             04100120
LINE   13        READ(I8)     K1,WROW                                              04100130
LINE   14        IF(K1.NE.K)  RETURN                                               04100140
LINE   15   60   CONTINUE                                                         04100150
LINE   16        NNZ = 0                                                           04100160
LINE   17        L = IF                                                            04100170
LINE   18        DO 100       J = 1,NSPT                                           04100180
LINE   19        AROWJ =  WROW(L)                                                  04100190
LINE   20        AR   =         AROWJ                                              04100200
LINE   21        AI   = AIMAG (AROWJ)                                              04100210
LINE   22        AC   = SQRT( AR **2 & AI **2)                                     04100220
LINE   23        IF  (  AC   .EQ.  0.0)  GO TO 100                                 04100230
LINE   24        NNZ = NNZ & 1                                                     04100240
LINE   25        IZ(NNZ) = NNCH(J)                                                 04100250
LINE   26        AROW(NNZ) = AROWJ                                                 04100260
LINE   27    100 L=L&NFREQ                                                         04100270
LINE   28        IF (NNZ .NE.0)  WAKENZ =.TRUE.                                    04100280
LINE   29        IF(NNZ.EQ.0) RETURN                                               04100290
LINE   30        CALL WRITZW( I12, K1,NNZ, IZ,AROW)                                04100300
LINE   31        KST12 =K1                                                         04100310
LINE   32        RETURN                                                            04100320
LINE   33        END                                                               04100330
```

```
DISPLAY...FILE          DECK 42

LINE    1          SUBROUTINE WINGCK(CORNX,CORNY,CORNZ, NWING, ICN, ERROR, I6 )      04200010
LINE    2          LOGICAL ERROR                                                     04200020
LINE    3          DIMENSION CORNX(1), CORNY(1), CORNZ(1)                            04200030
LINE    4  C            CHECK ON VALIDITY OF CORNER POINTS OF WING                   04200040
LINE    5          ICNM1 = ICN-1                                                     04200050
LINE    6          DO 10 I=1,ICNM1,2                                                 04200060
LINE    7          J = I & 1                                                         04200070
LINE    8          IF(CORNX(J) .LT. CORNX(I) ) GO TO 5                               04200080
LINE    9          IF(CORNY(J) .NE. CORNY(I) ) GO TO 5                               04200090
LINE   10          IF(CORNZ(J) .NE. CORNZ(I) ) GO TO 5                               04200100
LINE   11          GO TO 10                                                          04200110
LINE   12        5 WRITE( I6, 1001 ) I, J, NWING                                     04200120
LINE   13          ERROR = .TRUE.                                                    04200130
LINE   14       10 CONTINUE                                                          04200140
LINE   15          RETURN                                                            04200150
LINE   16     1001 FORMAT( // 120(1H*) /32H ERROR IN DEFINING CORNER POINTS, I2,     04200160
LINE   17         1  3HAND, I2,8H OF WING, I2 / )                                   04200170
LINE   18          END                                                               04200180
```


C3

DISPLAY...FILE DECK 43

```
LINE    1        SUBROUTINE WINGIN(I5, I6, NWING, NSECT, AR, NSP, CORNX, CORNY,     04300010
LINE    2       1             CORNZ, SYM, ICL, CL, ERROR, BEETA, IPW, NFREQ, FREQ,  04300020
LINE    3       2              REFLEN, LAB, ID, FD )                                04300030
LINE    4  C                                                                        04300040
LINE    5  C          THIS ROUTINE READS AND WRITES INPUT FOR WING DATA             04300050
LINE    6  C                                                                        04300060
LINE    7  C     INPUT                                                              04300070
LINE    8  C                                                                        04300080
LINE    9  C         I5      INPUT UNIT ( USUALLY CARD READER 5 )                  04300090
LINE   10  C         I6      OUTPUT UNIT ( PRINTER 6 )                             04300100
LINE   11  C         BEETA   SQRT(MACH*MACH-1) USED TO TRANSFORM CORNX AND CL       04300110
LINE   12  C         ERROR   LOGICAL THAT COMES IN FALSE,MAY BE SET TRUE            04300120
LINE   13  C                                                                        04300130
LINE   14  C     OUTPUT                                                             04300140
LINE   15  C                                                                        04300150
LINE   16  C         NWING   NUMBER OF WING READ FOR STRUCTURE                      04300160
LINE   17  C         NSECT   ARRAY- NO. SECTIONS IN EACH WING                       04300170
LINE   18  C         AR      ARRAY- ASPECT RATIO OF EACH WING                      04300180
LINE   19  C         NSP     NSP(I,J) NO. SPANS FOR SECTION I OF WING J            04300190
LINE   20  C         CORNX,CORNY,CORNZ  X,Y,AND Z COORD. OF CORNER PTS. OF WING    04300200
LINE   21  C         SYM     SYM(J)   SYMMETRY CODE FOR WING J (A REAL MATRIX)     04300210
LINE   22  C                 SYM=  FOR SYMMETRY, -1 FOR ANTI-SYM, 0 FOR NO SYM.    04300220
LINE   23  C         ICL     ICL(I,J) CODE FOR SECTION I OF WING J                 04300230
LINE   24  C                 ICL(I,J) = -1 SPECIFIC GRID INFORMATION IS INPUT       04300240
LINE   25  C                 ICL(I,J) =  0 AUTOMATIC MESH - NO CONTROL LINES       04300250
LINE   26  C                 ICL(I,J) = 1, OR 2   AUTO MESH WITH 1 OR 2 CONTROL L. 04300260
LINE   27  C         CL      X COORD OF CONTROL LINES FOR EACH SECTION             04300270
LINE   28  C                 CL IS READ IN REF. SYSTEM, THEN DIVIDED BY BEETA      04300280
LINE   29  C         LAB, ID, FD  INFORMATION ON LAST CARD READ                     04300290
LINE   30  C                                                                        04300300
LINE   31        LOGICAL ERROR, CLINPT                                              04300310
LINE   32        LOGICAL FREQR                                                      04300320
LINE   33        DIMENSION CORNX(8,4), CORNY(8,4), CORNZ(8,4), CL(4,3,4)            04300330
LINE   34        DIMENSION FREQ(1), IPW(1)                                          04300340
LINE   35        DIMENSION NSECT(1), AR(1), NSP(3,4), ICL(3,4), ID(9), FD(4)        04300350
LINE   36        DIMENSION  SK1(4), SK2(4), SK3(4), SKODE(4)                        04300360
LINE   37        DIMENSION SYM(4)                                                   04300370
LINE   38  C                                                                        04300380
LINE   39        DATA L1, L2, L3, L4, LB / 4HGRID, 4HWING, 4HCORN, 4HLINE, 4H    / 04300390
LINE   40        DATA L5, L6, LEND / 4HFREQ, 4HMODE, 4HEND /                        04300400
LINE   41        DATA SK1 / 4H(SYM, 4HMETR, 4HIC) , 4H      /                       04300410
LINE   42        DATA SK2 / 4H(ANT, 4HI-SY, 4HMMET, 4HRIC)  /                       04300420
LINE   43        DATA SK3 / 4H(NOT, 4H SYM, 4HMETR, 4HIC)   /                       04300430
LINE   44  C                                                                        04300440
LINE   45        FREQR = .FALSE.                                                    04300450
LINE   46        NWING = 0                                                          04300460
LINE   47        BEEREFL = BEETA*REFLEN                                             04300470
LINE   48  C                                                                        04300480
LINE   49  C     ---------------------------------------------------------------    04300490
LINE   50  C                                                                        04300500
LINE   51   10   READ( I5,1000 ) LAB,  ID, FD                                       04300510
LINE   52  C                                                                        04300520
LINE   53        IF( LAB .EQ. L2 ) GO TO 20                                         04300530
LINE   54        IF( LAB .EQ. L4 ) GO TO 40                                         04300540
LINE   55        IF( LAB .EQ. L1) GO TO 80                                          04300550
LINE   56        IF( LAB .EQ. L6 ) GO TO 65                                         04300560
```

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LINE   57          IF( LAB .EQ. L5 ) GO TO 50                                    04300570
LINE   58          IF( LAB .EQ. LEND ) GO TO 60                                  04300580
LINE   59          IF( LAB .EQ. LB ) GO TO 70                                    04300590
LINE   60   C                                                                    04300600
LINE   61   C           INVALID LABEL CARD READ                                  04300610
LINE   62          WRITE( I6, 2000 )                                             04300620
LINE   63          WRITE( I6, 2018 )                                             04300630
LINE   64          WRITE( I6, 2017 ) LAB, ID , FD                                04300640
LINE   65          ERROR = .TRUE.                                                04300650
LINE   66          GO TO 10                                                      04300660
LINE   67   C                                                                    04300670
LINE   68   C     ------------------------------------------------------------   04300680
LINE   69   C                                                                    04300690
LINE   70    20    CONTINUE                                                      04300700
LINE   71   C           'WING' CARD HAS BEEN READ.                               04300710
LINE   72   C                                                                    04300720
LINE   73          CLINPT = .FALSE.                                              04300730
LINE   74          NWING = NWING & 1                                             04300740
LINE   75   C                                                                    04300750
LINE   76          JW = ID(1)                                                    04300760
LINE   77          NC = ID(2)                                                    04300770
LINE   78          ISYM = ID(3)                                                  04300780
LINE   79          IPW(JW) = ID(4)                                               04300790
LINE   80          NS = ID(5)                                                    04300800
LINE   81   C                                                                    04300810
LINE   82          IF( NWING .LE. 4 ) GO TO 21                                   04300820
LINE   83   C           MORE THAN 4 WING DATA CARDS READ                         04300830
LINE   84          WRITE( I6, 2000 )                                             04300840
LINE   85          WRITE( I6, 2001 )                                             04300850
LINE   86          WRITE( I6, 2004 )                                             04300860
LINE   87          ERROR = .TRUE.                                                04300870
LINE   88    21    CONTINUE                                                      04300880
LINE   89          IF( NWING .EQ. ID(1) ) GO TO 22                               04300890
LINE   90   C           WING DATA CARD OUT OF SEQUENCE                           04300900
LINE   91          WRITE( I6, 2000 )                                             04300910
LINE   92          WRITE( I6, 2001 )                                             04300920
LINE   93          WRITE( I6, 2002 ) ID(1), NWING                                04300930
LINE   94          ERROR = .TRUE.                                                04300940
LINE   95    22    CONTINUE                                                      04300950
LINE   96          IF( ID(1) .GT. 0 .AND. ID(1) .LE. 4 ) GO TO 23                04300960
LINE   97   C           WING NUMBER NOT BETWEEN 1 AND 4                          04300970
LINE   98          WRITE( I6, 2000 )                                             04300980
LINE   99          WRITE( I6, 2001 )                                             04300990
LINE  100          WRITE( I6, 2003 ) ID(1)                                       04301000
LINE  101          ERROR = .TRUE.                                                04301010
LINE  102          JW = 1                                                        04301020
LINE  103    23    CONTINUE                                                      04301030
LINE  104          IF( NS .LE. 3 ) GO TO 24                                      04301040
LINE  105   C           MORE THAN 3 SECTIONS INPUT FOR GIVEN WING                04301050
LINE  106          WRITE( I6, 2000 )                                             04301060
LINE  107          WRITE( I6, 2001 )                                             04301070
LINE  108          WRITE( I6,2005 ) JW, NS                                       04301080
LINE  109          ERROR = .TRUE.                                                04301090
LINE  110          NS = 3                                                        04301100
LINE  111    24    CONTINUE                                                      04301110
LINE  112          NST = (NC&1)/2 - 1                                            04301120
LINE  113          IF(NS .EQ. NST ) GO TO 25                                     04301130
LINE  114   C           NO. CORNER PTS NOT CONSISTANT WITH NO. SECTIONS OF WING   04301140
LINE  115          WRITE( I6, 2000 )                                             04301150
LINE  116          WRITE( I6, 2001 )                                             04301160
LINE  117          WRITE( I6, 2006 ) NC, NS, JW                                  04301170
LINE  118          ERROR = .TRUE.                                                04301180
```

```
LINE 119          IF( NST .LE. 3 ) NS = NST                                    04301190
LINE 120       25 CONTINUE                                                     04301200
LINE 121     C                                                                 04301210
LINE 122          NSECT(JW) = NS                                               04301220
LINE 123          SYM(JW) = FLOAT(ISYM)                                        04301230
LINE 124          DO 26 I=1,NS                                                 04301240
LINE 125          ICL(I,JW)=0                                                  04301250
LINE 126       26 NSP(I,JW) = ID(I&5)                                          04301260
LINE 127          AR(JW) = FD(1)                                               04301270
LINE 128     C                                                                 04301280
LINE 129     C         CHECK ON SYMMETRY CODE                                  04301290
LINE 130          IF( IABS(ISYM) .LE. 1 ) GO TO 27                             04301300
LINE 131          WRITE( I6, 2000 )                                            04301310
LINE 132          WRITE( I6, 2001 )                                            04301320
LINE 133          WRITE( I6, 2022 ) JW, ISYM                                   04301330
LINE 134          ERROR = .TRUE.                                               04301340
LINE 135       27 CONTINUE                                                     04301350
LINE 136     C                                                                 04301360
LINE 137          IF( ISYM ) 28, 30, 32                                        04301370
LINE 138       28 CONTINUE                                                     04301380
LINE 139          DO 29 I = 1,4                                                04301390
LINE 140       29 SKODE(I) = SK2(I)                                            04301400
LINE 141          GO TO 34                                                     04301410
LINE 142       30 CONTINUE                                                     04301420
LINE 143          DO 31 I = 1,4                                                04301430
LINE 144       31 SKODE(I) = SK3(I)                                            04301440
LINE 145          GO TO 34                                                     04301450
LINE 146       32 CONTINUE                                                     04301460
LINE 147          DO 33 I = 1,4                                                04301470
LINE 148       33 SKODE(I) = SK1(I)                                            04301480
LINE 149     C                                                                 04301490
LINE 150       34 CONTINUE                                                     04301500
LINE 151     C                                                                 04301510
LINE 152          WRITE( I6, 3000 ) JW, NC, ISYM, SKODE, IPW(JW), NSECT(JW)    04301520
LINE 153          WRITE( I6, 3001 ) ( I, NSP(I,JW),I=1,NS )                    04301530
LINE 154          WRITE( I6, 3005 ) AR(JW)                                     04301540
LINE 155     C                                                                 04301550
LINE 156     C                                                                 04301560
LINE 157     C           READ CORNER POINTS                                    04301570
LINE 158     C                                                                 04301580
LINE 159          DO 36 I=1,NC                                                 04301590
LINE 160          READ( I5, 1000 ) LAB, ID, FD                                 04301600
LINE 161          IF( I .GT. 1 ) GO TO 35                                      04301610
LINE 162          IF( LAB .EQ. L3 ) GO TO 35                                   04301620
LINE 163     C         CORNER DATA CARD MISSING                                04301630
LINE 164          WRITE( I6, 2000 )                                            04301640
LINE 165          WRITE( I6, 2007 ) JW                                         04301650
LINE 166          ERROR = .TRUE.                                               04301660
LINE 167       35 CONTINUE                                                     04301670
LINE 168          CORNX(I,JW) = FD(1)                                          04301680
LINE 169          CORNY(I,JW) = FD(2)                                          04301690
LINE 170          CORNZ(I,JW) = FD(3)                                          04301700
LINE 171       36 CONTINUE                                                     04301710
LINE 172     C                                                                 04301720
LINE 173          WRITE(I6,3004) JW, (I,CORNX(I,JW),CORNY(I,JW),CORNZ(I,JW),I=1,NC) 04301730
LINE 174     C                                                                 04301740
LINE 175          IF(  2*(NC/2) .EQ. NC ) GO TO 37                             04301750
LINE 176          CORNX(NC&1,JW) = CORNX(NC,JW)                                04301760
LINE 177          CORNY(NC&1,JW) = CORNY(NC,JW)                                04301770
LINE 178          CORNZ(NC&1,JW) = CORNZ(NC,JW)                                04301780
LINE 179          NC = NC&1                                                    04301790
LINE 180       37 CONTINUE                                                     04301800
```

```
LINE 181  C                                                                    04301810
LINE 182  C          CALL ROUTINE TO CHECK FOR PHYSICAL ERROR ON CORNER POINT   04301820
LINE 183        CALL WINGCK(CORNX(1,JW),CORNY(1,JW),CORNZ(1,JW),JW,NC,ERROR,I6) 04301830
LINE 184  C                                                                    04301840
LINE 185        DO 38 I=1,NC                                                   04301850
LINE 186        CORNX(I,JW) = CORNX(I,JW)/BEERFL                               04301860
LINE 187        CORNY(I,JW) = CORNY(I,JW)/REFLEN                               04301870
LINE 188        CORNZ(I,JW) = CORNZ(I,JW)/REFLEN                               04301880
LINE 189     38 CONTINUE                                                       04301890
LINE 190        GO TO 10                                                       04301900
LINE 191  C                                                                    04301910
LINE 192     40 CONTINUE                                                       04301920
LINE 193  C                                                                    04301930
LINE 194  C          SECTION TO PROCESS CONTROL LINE  INFORMATION               04301940
LINE 195  C                                                                    04301950
LINE 196        IS = ID(1)                                                     04301960
LINE 197        K = ICL(IS,JW) & 1                                             04301970
LINE 198        ICL(IS,JW) = K                                                 04301980
LINE 199        IF( IS .LE. NSECT(JW) ) GO TO 41                               04301990
LINE 200  C          CONTROL LINE SPECIFIED FOR SECTION THAT DOES NOT EXIST     04302000
LINE 201        WRITE( I6, 2000 )                                              04302010
LINE 202        WRITE( I6, 2008 ) JW                                           04302020
LINE 203        WRITE( I6,2011 ) IS, JW, NSECT(JW)                             04302030
LINE 204        ERROR = .TRUE.                                                 04302040
LINE 205        GO TO 10                                                       04302050
LINE 206     41 CONTINUE                                                       04302060
LINE 207        IF( K .LE. 2 ) GO TO 42                                        04302070
LINE 208  C          MORE THAN TWO CONTROL LINES READ FOR SAME SECTION          04302080
LINE 209        WRITE( I6, 2000 )                                              04302090
LINE 210        WRITE( I6, 2008 ) JW                                           04302100
LINE 211        WRITE( I6, 2009) IS                                            04302110
LINE 212        ERROR = .TRUE.                                                 04302120
LINE 213     42 CONTINUE                                                       04302130
LINE 214        IF( K .EQ. ID(2) ) GO TO 43                                    04302140
LINE 215  C          CONTROL LINE DATA OUT OF SEQUENCE                         04302150
LINE 216        WRITE( I6, 2000 )                                              04302160
LINE 217        WRITE( I6, 2008 ) JW                                           04302170
LINE 218        WRITE( I6, 2010 ) IS                                           04302180
LINE 219        ERROR = .TRUE.                                                 04302190
LINE 220     43 CONTINUE                                                       04302200
LINE 221  C                                                                    04302210
LINE 222        IF( .NOT. CLINPT ) WRITE( I6, 3002) JW                         04302220
LINE 223  C                                                                    04302230
LINE 224        CLINPT = .TRUE.                                                04302240
LINE 225        WRITE( I6, 3003 ) IS, K, FD(1), FD(2)                          04302250
LINE 226  C                                                                    04302260
LINE 227        X1 = FD(1)/BEERFL                                              04302270
LINE 228        X2 = FD(2)/BEERFL                                              04302280
LINE 229        ICN = 2*IS - 1                                                 04302290
LINE 230        IF( X1 .LT. CORNX(ICN,JW) )   GO TO 44                         04302300
LINE 231        IF( X1 .GT. CORNX(ICN&1,JW) ) GO TO 44                         04302310
LINE 232        IF( X2 .LT. CORNX(ICN&2,JW) ) GO TO 44                         04302320
LINE 233        IF( X2 .GT. CORNX(ICN&3,JW) ) GO TO 44                         04302330
LINE 234        GO TO 45                                                       04302340
LINE 235     44 CONTINUE                                                       04302350
LINE 236  C          CONTROL LINE DEFINED OUTSIDE OF SECTION                   04302360
LINE 237        WRITE( I6, 2000 )                                              04302370
LINE 238        WRITE( I6, 2008 ) JW                                           04302380
LINE 239        WRITE( I6, 2012 ) K, IS                                        04302390
LINE 240        ERROR = .TRUE.                                                 04302400
LINE 241     45 CONTINUE                                                       04302410
LINE 242        IF( K .EQ. 1 ) GO TO 46                                        04302420
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LINE 243          IF( X1 .GE. CL(1,IS,JW)  .AND.  X2 .GE. CL(2,IS,JW) ) GO TO 46     04302430
LINE 244  C            SECOND CONTROL LINE DEFINED ABOVE FIRST                        04302440
LINE 245          WRITE( 16, 2000 )                                                   04302450
LINE 246          WRITE( 16, 2008 ) JW                                                04302460
LINE 247          WRITE( 16, 2013 ) IS                                                04302470
LINE 248          ERROR = .TRUE.                                                      04302480
LINE 249       46 CONTINUE                                                            04302490
LINE 250          JCN = 2*K - 1                                                       04302500
LINE 251          CL(JCN,IS,JW) = X1                                                  04302510
LINE 252          CL(JCN+1,IS,JW) = X2                                                04302520
LINE 253          GO TO 10                                                            04302530
LINE 254  C                                                                           04302540
LINE 255       50 CONTINUE                                                            04302550
LINE 256  C            FREQUENCY CARD READ                                            04302560
LINE 257          DO 55  I =1, 4                                                      04302570
LINE 258       55 FREQ(I) = FD(I)                                                     04302580
LINE 259          NFREQ = ID(1)                                                       04302590
LINE 260          IF( NFREQ .GT. 4 ) READ( 15, 1001 ) ( FREQ(I), I=5, NFREQ )        04302600
LINE 261          WRITE( 16, 3006 )       NFREQ, ( FREQ(I), I=1,NFREQ)                04302610
LINE 262          FREQR = .TRUE.                                                      04302620
LINE 263          GO TO 10                                                            04302630
LINE 264  C                                                                           04302640
LINE 265       60 CONTINUE                                                            04302650
LINE 266  C            END CARD READ                                                  04302660
LINE 267  C            MODE DATA IS MISSING                                           04302670
LINE 268          WRITE( 16, 2000 )                                                   04302680
LINE 269          IF( .NOT. FREQR ) WRITE( 16, 2015 )                                 04302690
LINE 270          WRITE( 16, 2014 )                                                   04302700
LINE 271          ERROR = .TRUE.                                                      04302710
LINE 272          RETURN                                                              04302720
LINE 273  C                                                                           04302730
LINE 274       65 CONTINUE                                                            04302740
LINE 275          IF( FREQR ) RETURN                                                  04302750
LINE 276          WRITE( 16, 2000 )                                                   04302760
LINE 277          WRITE( 16, 2015 )                                                   04302770
LINE 278          ERROR = .TRUE.                                                      04302780
LINE 279          RETURN                                                              04302790
LINE 280  C                                                                           04302800
LINE 281       70 CONTINUE                                                            04302810
LINE 282  C            LABEL CARD EXPECTED BUT NOT RECEIVED                           04302820
LINE 283          WRITE( 16, 2000 )                                                   04302830
LINE 284          WRITE( 16,2016 )                                                    04302840
LINE 285          WRITE( 16, 2017 ) LAB, ID , FD                                      04302850
LINE 286          ERROR = .TRUE.                                                      04302860
LINE 287          GO TO 10                                                            04302870
LINE 288  C                                                                           04302880
LINE 289       80 CONTINUE                                                            04302890
LINE 290  C            GRID CARD READ                                                 04302900
LINE 291          I = ID(2)                                                           04302910
LINE 292          J = ID(1)                                                           04302920
LINE 293          IF( I .GT. NSECT(J) ) GO TO 81                                      04302930
LINE 294          IF( J .GT. NWING ) GO TO 81                                         04302940
LINE 295          ICL(I,J) = -1                                                       04302950
LINE 296          RETURN                                                              04302960
LINE 297       81 CONTINUE                                                            04302970
LINE 298  C            GRID DATA SPECIFIED FOR SECTION THAT DOES NOT EXIST             04302980
LINE 299          WRITE( 16, 2000 )                                                   04302990
LINE 300          WRITE( 16, 2020 )                                                   04303000
LINE 301          WRITE( 16, 2021 ) J, I                                              04303010
LINE 302          ERROR = .TRUE.                                                      04303020
LINE 303          RETURN                                                              04303030
LINE 304  C                                                                           04303040
```

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LINE 305   1000 FORMAT( A4, 2X, 9I2, 4E12.0 )                                  04303050
LINE 306   1001 FORMAT( 24X, 4E12.0 )                                          04303060
LINE 307  C                                                                    04303070
LINE 308   2000 FORMAT(/// 1X, 129(1H*) /// ERROR IN READING INPUT.  )         04303080
LINE 309   2001 FORMAT(29H WING DATA CARD IS INCORRECT. )                       04303090
LINE 310   2002 FORMAT( 14H DATA FOR WING, I2,28H WAS READ WHEN DATA FOR WING, I3,04303100
LINE 311       1 28H WAS EXPECTED BY THE PROGRAM // )                          04303110
LINE 312   2003 FORMAT( 82H WING NUMBER MUST BE GREATER THAN ZERO AND LESS THAN OR04303120
LINE 313       1 EQUAL TO 4. IT WAS READ AS, I2 /56H IT WILL BE TREATED AS WING 1 04303130
LINE 314       2FOR FOR CHECK PURPOSE ONLY / )                                 04303140
LINE 315   2004 FORMAT( 47H NO MORE THAN FOUR WING DATA CARDS MAY BE INPUT )    04303150
LINE 316   2005 FORMAT( 34H NUMBER OF SECTIONS INPUT FOR WING, I2,3H IS, I2 /  04303160
LINE 317       1 47H THIS IS GREATER THAN THE MAXIMUM PER WING OF 3 )           04303170
LINE 318   2006 FORMAT( 24H NUMBER OF CORNER POINTS, I2, 19H IS NOT CONSISTANT ,04303180
LINE 319       1 27HWITH THE NUMBER OF SECTIONS, I2,  9H FOR WING, I2  )        04303190
LINE 320   2007 FORMAT(36H *CORNER* DATA CARD MISSING FOR WING, I2 )           04303200
LINE 321   2008 FORMAT(43H ERROR ON CONTROL 'LINE' DATA CARD FOR WING, I2 )    04303210
LINE 322   2009 FORMAT(54H MORE THAN TWO CONTROL LINES ARE SPECIFIED FOR SECTION,04303220
LINE 323       I  I2 )                                                         04303230
LINE 324   2010 FORMAT(49H CONTROL LINES ARE NOT INPUT IN ORDER FOR SECTION, I2 )04303240
LINE 325   2011 FORMAT(38H CONTROL LINE IS SPECIFIED FOR SECTION, I2, 8H OF WING,04303250
LINE 326       1 I2 /  14H THIS WING HAS, I2,  31H SECTIONS. CONTROL LINE IGNORED)04303260
LINE 327   2012 FORMAT(13H CONTROL LINE, I2, 12H FOR SECTION, I2,44H IS NOT DEFINE04303270
LINE 328       1D TO BE INSIDE OF THE SECTION. )                               04303280
LINE 329   2013 FORMAT( 26H CONTROL LINE 2 OF SECTION, I2, 33H IS ABOVE THE FIRST 04303290
LINE 330       1CONTROL LINE.  )                                               04303300
LINE 331  *2014 FORMAT(37H MODE DATA IS MISSING OR OUT OF ORDER )              04303310
LINE 332  *2015 FORMAT(42H FREQUENCY DATA IS MISSING OR OUT OF ORDER )         04303320
LINE 333  *2016 FORMAT( 42H A LABEL CARD IS EXPECTED BUT NOT PRESENT. )        04303330
LINE 334  *2017 FORMAT(                                          67H CARD WILL B04303340
LINE 335  *     1E PRINTED ON FOLLOWING LINE AND NEXT CARD WILL BE READ. / 1X,  04303350
LINE 336       2 A4, 2X, 9I2,4E12.0 )                                          04303360
LINE 337   2018 FORMAT( 32H AN INVALID LABEL CARD WAS READ. )                  04303370
LINE 338   2020 FORMAT( 27H ERROR ON GRID LABEL CARD. )                        04303380
LINE 339   2021 FORMAT( 27H GRID DATA PRESENT FOR WING, I2, 8H SECTION, I2 /   04303390
LINE 340       1 53H THIS SECTION HAS NOT BEEN DEFINED FOR THE STRUCTURE.  )   04303400
LINE 341   2022 FORMAT( 23H SYMMETRY CODE FOR WING, I2, 12H IS INPUT AS, I4 /  04303410
LINE 342       1 41H SYMMETRY CODE MAY ONLY EQUAL -1, 0, OR 1 / )              04303420
LINE 343  C                                                                    04303430
LINE 344   3000 FORMAT(////20X,          13HDATA FOR WING, I2 // 24X,          04303440
LINE 345       1 23HNUMBER OF CORNER POINTS, I6  //  24X,                     04303450
LINE 346       2 13HSYMMETRY CODE, I16 / 24X, 4A4 // 24X,                      04303460
LINE 347       3 17HOUTPUT PRINT CODE, I12  // 24X,                          04303470
LINE 348       4 16HNUMBER OF SECTIONS, I11 //                                 04303480
LINE 349       5  24X, 18HNUMBER OF SPANS IN  )                                04303490
LINE 350   3001 FORMAT(  33X,  7HSECTION, I2, I11)                            04303500
LINE 351   3002 FORMAT( /24X,22HCONTROL LINES FOR WING, I2 / 24X, 12HSECTION LINE,04303510
LINE 352       1  10X, 2HX1, 14X, 2HX2 )                                       04303520
LINE 353   3003 FORMAT( 26X, 2I5,5X, 2E16.5 )                                 04303530
LINE 354   3004 FORMAT( / 24X, 40HCOORDINATES OF THE CORNER POINTS OF WING, I2 04303540
LINE 355       1  /  30X, 1HX, 15X, 1HY, 15X, 1HZ  / ( 20X, I5, 3E16.5 )  )   04303550
LINE 356   3005 FORMAT( / 24X, 12HASPECT RATIO, F17.4 )                        04303560
LINE 357   3006 FORMAT(                          // // 20X, 21HNUMBER OF FREQUENCI04303570
LINE 358       1ES, I12  / 20X, 19HLIST OF FREQUENCIES, 5F14.4 / (39X, 5F14.4) )04303580
LINE 359  C                                                                    04303590
LINE 360        END                                                            04303600
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DISPLAY...FILE DECK 44

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LINE    1          SUBROUTINE WINTGR( X, Y, [illegible]                                  04400010
LINE    2          COMPLEX WTES                                                          04400020
LINE    3          INTEGER GOBACK                                                        04400030
LINE    4          LOGICAL EREONE, EMIRRO, TRAILR, [illegible]                           04400040
LINE    5          LOGICAL ERROR                                                         04400050
LINE    6          LOGICAL MIRROR                                                        04400060
LINE    7          LOGICAL TEXCD                                                         04400070
LINE    8          LOGICAL TRAINF                                                        04400080
LINE    9          LOGICAL TREDGE, WAKE1                                                 04400090
LINE   10          DIMENSION CXR(12), CXI(12)                                            04400100
LINE   11          DIMENSION RKTERM(30),                                                 04400110
LINE   12          DIMENSION SKA(30)                                                     04400120
LINE   13          DIMENSION WLEAD(20)                                                   04400130
LINE   14          DIMENSION WSAVE(20)                                                   04400140
LINE   15          DIMENSION X(1), Y(1), WROW(1)                                         04400150
LINE   16          COMMON/BASIC/MACH,BEETA,KAPPA,IPRNT(5)                                04400160
LINE   17          COMMON / EEW / XUP, YUP, XLW, YLW, EREONE, EMIRRO, RR, RL, RTR,RTL    04400170
LINE   18          COMMON / FQ1 / NFREQ, CF(12,30), FREQ(12), FREQP(12), FRTEST,NTMXX    04400180
LINE   19          COMMON / RRLL / TVW(4), YRO, YLO, ZR, ZRZR, ZL, ZLZL, IRL, IIN        04400190
LINE   20          COMMON /WAKE/ ITWM, ITW, ICNVGW, EPSW, JCNVGW,LRWTE ,IWTE             04400200
LINE   21          COMMON / WAKEUP / WTES(12), TREDGE, WAKE1                             04400210
LINE   22          COMMON / WV1 / NTERM, V(30), W(30)                                    04400220
LINE   23          COMMON / WW1 / XO,YO,ZD,ZDZD, SYMK, NLNSID                            04400230
LINE   24          COMMON  / ZFDZID / I5, 16                                             04400240
LINE   25          DATA KCONV  / 0 /                                                     04400250
LINE   26          DATA RKTERM  / 0.221, 0.645, 1.192, 1.807, 2.461, 3.14, 3.835,       04400260
LINE   27         1   4.541, 5.255, 5.974, 6.697, 7.42, 8.15, 8.88, 9.61, 10.34,       04400270
LINE   28         2   11.08, 11.81, 12.55, 13.28, 14.02, 14.76, 15.49, 16.23, 16.97,   04400280
LINE   29         3   17.71, 18.44, 19.18, 19.92, 20.6   /                             04400290
LINE   30  C          X       X COOR. OF POINTS OF INFLUENCING ELEMENT                  04400300
LINE   31  C          Y       Y COOR. OF POINTS OF INFLUENCING ELEMENT                  04400310
LINE   32  C          XO        X COORDINATE OF RECEIVING PT. (CENTER OF ELEMENT )      04400320
LINE   33  C          YRO       Y COORDINATE OF RECEIVING PT. (IN RIGHT SIDE )        04400330
LINE   34  C          YLO       Y COORDINATE OF RECEIVING PT. (IN LEFT SIDE ))        04400340
LINE   35  C          ZD        DIFFERENCE BETWEEN Z'S  OF INFLU. AND RECEIV. ELEM.   04400350
LINE   36  C          ZDZD IS THE SQUARE OF THE DIFFERENCE OF THE REC AND INFL Z'S     04400360
LINE   37  C          TVW     TRANSFORMATION TO COMBINE UPWASH AND SIDEWASH            04400370
LINE   38  C          NTERM   NO. TERMS IN APPROXIMATION OF VELOCITY INTEGRALS         04400380
LINE   39  C          SYM       SYMMETRY CODE ( 0.0 FOR NO SYMMETRY )                 04400390
LINE   40  C          ERROR   LOGICAL SET EQUAL TO TRUE IF AN ERROR IS DETECTED        04400400
LINE   41  C          WROW    AN ARRAY OF THE FREQUENCY INDEPENDENT TERMS OF THE      04400410
LINE   42  C                  VELOCITY INTEGALS FOR A FIVEN REC. ELEM AND INFL ELEM   04400420
LINE   43  C                  ENCING ELEMENT HAS NO INFLUENCE.(NOT MIRROR ELEMENT)    04400430
LINE   44  C          IFIRST  .TRUE. IF ELEMENT IS THE FIRST ELEMENT OF INFLU. SPAN    04400440
LINE   45  C          WAKE1   LOGICAL SET TO .TRUE. IF WAKE ELEMENT HAS INFLUENCE     04400450
LINE   46  C          TREDGE  LOGICAL INPUT AS TRUE IF INFL. ELEM. IS THE TRAILING    04400460
LINE   47  C                  EDGE ELEMENT OF ITS SPAN                                04400470
LINE   48  C          WTES(J) COMPLEX ARRAY OF INFLUENCE OF WAKE EFFECT FOR           04400480
LINE   49  C                  FREQUENCY J                                             04400490
LINE   50  C                                                                          04400500
LINE   51  C                                                                          04400510
LINE   52  C          INITIALIZE WROW TO ZERO                                         04400520
LINE   53  C                                                                          04400530
LINE   54          DO  10  I=1,NFREQ                                                  04400540
LINE   55     10   WROW(I) = 0.0                                                      04400550
LINE   56  C                                                                          04400560
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LINE  57  C           TEST LEADING EDGE LINE                                  04400570
LINE  58        YLW = Y(1)                                                    04400580
LINE  59        YUP = Y(2)                                                    04400590
LINE  60        XLW = X(1)                                                    04400600
LINE  61        XUP = X(2)                                                    04400610
LINE  62  C                                                                   04400620
LINE  63        CALL EONE                                                     04400630
LINE  64  C                                                                   04400640
LINE  65  C           IF ELEMENT IS NOT IN MACH CONE, RETURN WITH ZERO IN WROW.  04400650
LINE  66  C           PROCEES ANYWAY IF IT IS A SELF ELEMENT  (DIAGONAL TERM)  04400660
LINE  67        IF( EREONE  .OR.  IIN .EQ. IRC ) GO TO 20                     04400670
LINE  68  C                                                                   04400680
LINE  69        RETURN                                                        04400690
LINE  70  C                                                                   04400700
LINE  71     20 CONTINUE                                                      04400710
LINE  72        IF( IRC .EQ. 1  .AND.  IIN .EQ. 1 ) KCONV = 0                 04400720
LINE  73  C                                                                   04400730
LINE  74        ASSIGN 310 TO IWAKE1                                          04400740
LINE  75        ASSIGN 160 TO IWAKE2                                          04400750
LINE  76  C                                                                   04400760
LINE  77        NTERM = 1                                                     04400770
LINE  78        RRU = RR                                                      04400780
LINE  79        RLU = RL                                                      04400790
LINE  80        MIRROR = EMIRRO                                               04400800
LINE  81        TRAINF = .FALSE.                                              04400810
LINE  82        WAKE1 = .FALSE.                                               04400820
LINE  83        IF( .NOT. TREDGE ) GO TO 25                                   04400830
LINE  84  C           TEST TRAILING EDGE LINE                                 04400840
LINE  85  C                                                                   04400850
LINE  86        YLW = Y(2)                                                    04400860
LINE  87        YUP = Y(1)                                                    04400870
LINE  88        XLW = X(3)                                                    04400880
LINE  89        XUP = X(4)                                                    04400890
LINE  90  C                                                                   04400900
LINE  91        CALL EONE                                                     04400910
LINE  92  C                                                                   04400920
LINE  93        YLW = Y(1)                                                    04400930
LINE  94        YUP = Y(2)                                                    04400940
LINE  95        XLW = X(1)                                                    04400950
LINE  96        XUP = X(2)                                                    04400960
LINE  97  C                                                                   04400970
LINE  98        IF( .NOT. EREONE ) GO TO 40                                   04400980
LINE  99        TRAINF = .TRUE.                                               04400990
LINE 100        IF( LWTE .NE. 0  .AND.  RTR  .GT. 0.0 )  WAKE1 = .TRUE.       04401000
LINE 101        GO TO 40                                                      04401010
LINE 102  C                                                                   04401020
LINE 103   25   CONTINUE                                                      04401030
LINE 104        IF( NINSID .EQ. 0  ) GO TO 40                                 04401040
LINE 105        DO 30 I=1,NFREQ                                               04401050
LINE 106   30   WROW(I) = -WLEAD(I)                                          04401060
LINE 107  C                                                                   04401070
LINE 108   40   CONTINUE                                                      04401080
LINE 109        DO 45 I=1,NFREQ                                               04401090
LINE 110   45   WLEAD(I) = 0.0                                               04401100
LINE 111  C                                                                   04401110
LINE 112  C                                                                   04401120
LINE 113        NINSID = NINSID + 1                                           04401130
LINE 114  C                                                                   04401140
LINE 115        YO = YRO                                                      04401150
LINE 116        ZO = ZR                                                       04401160
LINE 117        ZOZO = ZR*ZR                                                  04401170
LINE 118        TV = TVR(1)                                                   04401180
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LINE 119          TW = TVW(2)                                                  04401190
LINE 120  C                                                                    04401200
LINE 121          IF( FRTEST .EQ. 0.0 ) GO TO 145                              04401210
LINE 122  C                                                                    04401220
LINE 123  C               SECTION FOR NEAR FIELD  [illegible] EDGE             04401230
LINE 124  C               DECIDE HOW MANY TERMS ARE [illegible]SED ON RK       04401240
LINE 125          RK = RRU*FRTEST                                              04401250
LINE 126          ASSIGN 145 TO GOBACK                                         04401260
LINE 127          GO TO 600                                                    04401270
LINE 128   145    CONTINUE                                                     04401280
LINE 129  C                                                                    04401290
LINE 130          CALL WVINT                                                   04401300
LINE 131  C                                                                    04401310
LINE 132          ASSIGN 150 TO GOBACK                                         04401320
LINE 133          GO TO 800                                                    04401330
LINE 134   150    CONTINUE                                                     04401340
LINE 135          DO 155 I=1,NFREQ                                             04401350
LINE 136          WLEAD(I) = WLEAD(I) & SKA(I)                                 04401360
LINE 137          WROW(I) = WROW(I) & SKA(I)                                   04401370
LINE 138   155    CONTINUE                                                     04401380
LINE 139  C                                                                    04401390
LINE 140          GO TO IWAKE2, ( 160, 320 )                                   04401400
LINE 141   160    CONTINUE                                                     04401410
LINE 142  C                                                                    04401420
LINE 143  C            CHECK IF LEFT HAND ELEMENT (MIRROR IMAGE) EXISTS        04401430
LINE 144  C                                                                    04401440
LINE 145          IF( .NOT. MIRROR ) GO TO 300                                 04401450
LINE 146  C            SECTION FOR LEFT HAND SIDE OF LEADING EDGE             04401460
LINE 147          IF( FRTEST .EQ. 0.0 ) GO TO 185                              04401470
LINE 148  C                                                                    04401480
LINE 149  C            SECTION FOR NEAR FIELD, LEFT HAND SIDE LEADING EDGE     04401490
LINE 150  C             DECIDE HOW MANY TERMS ARE NEEDED BASED ON RK           04401500
LINE 151          RK = RLU*FRTEST                                              04401510
LINE 152          ASSIGN 185 TO GOBACK                                         04401520
LINE 153          GO TO 600                                                    04401530
LINE 154   185    CONTINUE                                                     04401540
LINE 155  C                                                                    04401550
LINE 156          YO = YLO                                                     04401560
LINE 157          ZO = ZL                                                      04401570
LINE 158          ZOZO = ZLZL                                                  04401580
LINE 159          TV = TVW(3)                                                  04401590
LINE 160          TW = TVW(4)                                                  04401600
LINE 161  C                                                                    04401610
LINE 162          CALL WVINT                                                   04401620
LINE 163  C                                                                    04401630
LINE 164          ASSIGN 190 TO GOBACK                                         04401640
LINE 165          GO TO 800                                                    04401650
LINE 166   190    CONTINUE                                                     04401660
LINE 167          DO 195 I=1,NFREQ                                             04401670
LINE 168          WLEAD(I) = WLEAD(I) - SYMK*SKA(I)                            04401680
LINE 169          WROW(I) = WROW(I) - SYMK*SKA(I)                              04401690
LINE 170   195    CONTINUE                                                     04401700
LINE 171  C                                                                    04401710
LINE 172   300    CONTINUE                                                     04401720
LINE 173  C                                                                    04401730
LINE 174          IF( .NOT. TRAINF ) RETURN                                    04401740
LINE 175          GO TO IWAKE1, ( 310,320 )                                    04401750
LINE 176  C       ---------------------------------------------------------    04401760
LINE 177  C                                                                    04401770
LINE 178   310    CONTINUE                                                     04401780
LINE 179  C                                                                    04401790
LINE 180  C            FIND INFLUENCE OF TRAILING EDGE OF TRAILING EDGE ELEMENT 04401800
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LINE 181  C           (THE RIGHT HAND ELEMENT ONLY AT THIS TIME)                  04401810
LINE 182  C                                                                       04401820
LINE 183        ASSIGN 320 TO IWAKE1                                              04401830
LINE 184        ASSIGN 320 TO IWAKE2                                              04401840
LINE 185  C                                                                       04401850
LINE 186        YLW = Y(2)                                                        04401860
LINE 187        YUP = Y(1)                                                        04401870
LINE 188        XLW = X(3)                                                        04401880
LINE 189        XUP = X(4)                                                        04401890
LINE 190        YO = YRO                                                          04401900
LINE 191        ZO = ZR                                                           04401910
LINE 192        ZOZO = ZR*ZR                                                      04401920
LINE 193        TV = TVW(1)                                                       04401930
LINE 194        TW = TVW(2)                                                       04401940
LINE 195        SYM =-1.0                                                         04401950
LINE 196        MIRROR = EMIRRO                                                   04401960
LINE 197  C                                                                       04401970
LINE 198        DO 315 J=1,NFREQ                                                  04401980
LINE 199        WTES(J) = (0.0, 0.0)                                              04401990
LINE 200        WSAVE(J) = WLEAD(J)                                               04402000
LINE 201   315  WLEAD(J) = 0.0                                                    04402010
LINE 202  C                                                                       04402020
LINE 203        IF( FRTEST .EQ. 0.0 ) GO TO 145                                   04402030
LINE 204        RK = RR*FRTEST                                                    04402040
LINE 205        ASSIGN 145 TO GOBACK                                              04402050
LINE 206        GO TO 600                                                         04402060
LINE 207  C                                                                       04402070
LINE 208   320  CONTINUE                                                         04402080
LINE 209  C                                                                       04402090
LINE 210        IF( .NOT. WAKE1 ) GO TO 370                                       04402100
LINE 211  C                                                                       04402110
LINE 212  C           SECTION TO COMPUTE WAKE EFFECT                              04402120
LINE 213  C           THIS SECTION HANDLES BOTH RIGHT AND LEFT HAND ELEMENTS      04402130
LINE 214  C                                                                       04402140
LINE 215        Z1  = XO - XLW                                                    04402150
LINE 216        Z2  = XO -XUP                                                     04402160
LINE 217        E1  = YO - YLW                                                    04402170
LINE 218        E2  = YO - YUP                                                    04402180
LINE 219        Z3P = SQRT( E2*E2 & ZOZO )                                        04402190
LINE 220        Z4P = SQRT( E1*E1 & ZOZO )                                        04402200
LINE 221        ZTE = 0.5*(Z1&Z2)                                                 04402210
LINE 222        ZLW = 0.5*(Z3P&Z4P)                                               04402220
LINE 223  C           DIVIDE ZDIS=ZU-ZL INTO A NUMBER OF DIVISIONS                04402230
LINE 224        ZDIS  = ZTE - ZLW                                                 04402240
LINE 225        DS  = E2 - E1                                                     04402250
LINE 226        NW = ZDIS/DS                                                      04402260
LINE 227        IF( NW .EQ. 0 ) NW = 1                                            04402270
LINE 228        IF( FRTEST .EQ. 0.0 ) NW = 1                                      04402280
LINE 229        DELTAZ = ZDIS/NW                                                  04402290
LINE 230        ZSMZTE = -0.5*DELTAZ                                              04402300
LINE 231  C                                                                       04402310
LINE 232  C           FIND WAKE EFFECT OF TRAILING EDGE LINE                      04402320
LINE 233  C           (NOTE WLEAD WAS COMPUTED IN OPPOSITE DIRECTION)             04402330
LINE 234  C                                                                       04402340
LINE 235        DO 325 I=1,NFREQ                                                  04402350
LINE 236        FBZ = -( FREQ(I)/BFETA )*ZSMZTE                                   04402360
LINE 237        CXR(I) = COS( FBZ )                                               04402370
LINE 238        CXI(I) = SIN( FBZ )                                               04402380
LINE 239        WTES(I) = WTES(I) - CMPLX( WLEAD(I)*CXR(I), WLEAD(I)*CXI(I) )     04402390
LINE 240   325  CONTINUE                                                         04402400
LINE 241  C           IF NW=1 WE ARE DONE                                         04402410
LINE 242        IF( NW .EQ. 1 ) GO TO 370                                         04402420
```

```
LINE 243   C                                                                    04402430
LINE 244   C          SECTION TO FIND WAKE EFFECT OF THE REST OF THE WAKE ELEMENTS 04402440
LINE 245   C                                                                    04402450
LINE 246   C          XLW = AVERAGE X                                           04402460
LINE 247         XLW = 0.5*(XLW&XUP)                                            04402470
LINE 248   C          NOTE CHANGE IN DIRECTI...                                 04402480
LINE 249         YLW = Y(1)                                                     04402490
LINE 250         YUP = Y(2)                                                     04402500
LINE 251         ELS = (YO-YLW)**2 & ZDZD                                       04402510
LINE 252         EUS = (YO-YUP)**2 & ZDZD                                       04402520
LINE 253   C                                                                    04402530
LINE 254         DO 360 LINE = 2, NW                                            04402540
LINE 255   C                                                                    04402550
LINE 256         DO 227 I=1,NFREQ                                               04402560
LINE 257    227  WLEAD(I) = 0.0                                                 04402570
LINE 258   C                                                                    04402580
LINE 259         XLW = XLW & DELTAZ                                             04402590
LINE 260         XUP = XLW                                                      04402600
LINE 261         ZETA = XO - XLW                                                04402610
LINE 262         ZSMZTE = ZSMZTE - DELTAZ                                       04402620
LINE 263   C                                                                    04402630
LINE 264         IF( FRTEST .EQ. 0.0 ) GO TO 330                                04402640
LINE 265         RR = 0.5*( SQRT( ZETA**2 - ELS )  &  SQRT( ZETA**2 - EUS ) )   04402650
LINE 266         RK = RR*FRTEST                                                 04402660
LINE 267         ASSIGN 330 TO GOBACK                                           04402670
LINE 268         GO TO 600                                                      04402680
LINE 269    330  CONTINUE                                                       04402690
LINE 270   C                                                                    04402700
LINE 271         CALL WVINT                                                     04402710
LINE 272   C                                                                    04402720
LINE 273         ASSIGN 340 TO GOBACK                                           04402730
LINE 274         GO TO 800                                                      04402740
LINE 275    340  CONTINUE                                                       04402750
LINE 276         DO 345 I=1,NFREQ                                               04402760
LINE 277    345  WLEAD(I) = WLEAD(I) - SYM*SKA(I)                              04402770
LINE 278   C                                                                    04402780
LINE 279         DO 350 J=1,NFREQ                                               04402790
LINE 280         FBZ = -( FREQ(J)/BEETA )*ZSMZTE                                04402800
LINE 281         CXIPR = COS( FBZ )                                             04402810
LINE 282         CXIPI = SIN( FBZ )                                             04402820
LINE 283         WTES(J) = WTES(J)                                              04402830
LINE 284        1  & CMPLX( WLEAD(J)*(CXR(J)-CXIPR), WLEAD(J)*(CXI(J)-CXIPI) )  04402840
LINE 285         CXR(J) = CXIPR                                                 04402850
LINE 286         CXI(J) = CXIPI                                                 04402860
LINE 287    350  CONTINUE                                                       04402870
LINE 288   C                                                                    04402880
LINE 289   C          END LOOP ON LINE                                          04402890
LINE 290    360  CONTINUE                                                       04402900
LINE 291   C                                                                    04402910
LINE 292    370  CONTINUE                                                       04402920
LINE 293   C                                                                    04402930
LINE 294   C          CHECK IF MIRROR IMAGE OF TRAILING EDGE LINE HAS INFLUENCE AND04402940
LINE 295   C          HAS NOT YET BEEN CONSIDERED.                              04402950
LINE 296   C                                                                    04402960
LINE 297         IF( .NOT. EMIRRO ) GO TO 380                                   04402970
LINE 298         IF( RTL .LE. 0.0 ) GO TO 380                                   04402980
LINE 299   C          FIND INFLUENCE OF THE MIRROR IMAGE OF THE TRAILING EDGE.  04402990
LINE 300   C                                                                    04403000
LINE 301   C          SET EMIRRO TO .FALSE. SO THAT WE DO NOT BRANCH HERE AGAIN 04403010
LINE 302         EMIRRO = .FALSE.                                               04403020
LINE 303   C                                                                    04403030
LINE 304         DO 375 I=1,NFREQ                                               04403040
```

```
LINE 305    375  WLEAD(I) = 0.0                                                  04403050
LINE 306    C                                                                   04403060
LINE 307         XLW = X(3)                                                     04403070
LINE 308         XUP = X(4)                                                     04403080
LINE 309         YLW = Y(2)                                                     04403090
LINE 310         YUP = Y(1)                                                     04403100
LINE 311         YO = YLO                                                       04403110
LINE 312         ZO = ZL                                                        04403120
LINE 313         ZOZO = ZLZL                                                    04403130
LINE 314         TV = TVW(3)                                                    04403140
LINE 315         TW = TVW(4)                                                    04403150
LINE 316         SYM = SYMK                                                     04403160
LINE 317         IF( FRTEST .EQ. 0.0 ) GO TO 185                                04403170
LINE 318         RK = RL*FRTEST                                                 04403180
LINE 319         ASSIGN 185 TO GOBACK                                           04403190
LINE 320         GO TO 600                                                      04403200
LINE 321    C                                                                   04403210
LINE 322    380  CONTINUE                                                       04403220
LINE 323    C                                                                   04403230
LINE 324    C            WE ARE FINISHED CALCULATING WAKE EFFECT                04403240
LINE 325    C            AND/OR INFLUENCE OF TRAILING EDGE OF A TRAILING EDGE ELEMENT 04403250
LINE 326    C            PUT WLEAD BACK TO WSAVE AND RETRUN                     04403260
LINE 327    C                                                                   04403270
LINE 328         DO 390 I=1,NFREQ                                               04403280
LINE 329    390  WLEAD(I) = WSAVE(I)                                            04403290
LINE 330    C                                                                   04403300
LINE 331         RETURN                                                         04403310
LINE 332    C                                                                   04403320
LINE 333    C    ------------------------------------------------------------------04403330
LINE 334    C                                                                   04403340
LINE 335    600  CONTINUE                                                       04403350
LINE 336    C              SECTION TO FIND NUMBER OF TERMS TAKEN IN SERIES       04403360
LINE 337         IF( RK .GT. 20.5  ) GO TO 615                                  04403370
LINE 338         DO 610 NTERM=6,NTMXX                                           04403380
LINE 339         IF( RK .LE. RKTERM(NTERM) ) GO TO 620                          04403390
LINE 340    610  CONTINUE                                                       04403400
LINE 341    615  CONTINUE                                                       04403410
LINE 342         TEXCO = .TRUE.                                                 04403420
LINE 343         NCVEL = NCVEL & 1                                              04403430
LINE 344         NTERM = NTMXX                                                  04403440
LINE 345    620  CONTINUE                                                       04403450
LINE 346         NTERM = MINO( NTERM, NTMXX )                                   04403460
LINE 347         IF( RK .GT. RKEX  ) RKEX  = RK                                 04403470
LINE 348         IF( NTERM .GT. NTMAX ) NTMAX = NTERM                           04403480
LINE 349         GO TO GOBACK, ( 145, 185, 330 )                                04403490
LINE 350    C    ------------------------------------------------------------------04403500
LINE 351    C                                                                   04403510
LINE 352    C                                                                   04403520
LINE 353    800  CONTINUE                                                       04403530
LINE 354    C                                                                   04403540
LINE 355         DO 810 I=1,NFREQ                                               04403550
LINE 356    810  SKA(I) = 0.0                                                   04403560
LINE 357    C                                                                   04403570
LINE 358         NTM1 = MAXO( NTERM-1, 1 )                                      04403580
LINE 359         DO 820 J=1,NTM1                                                04403590
LINE 360         SAVE = TV*V(J) & TW*W(J)                                       04403600
LINE 361         DO 820 I=1,NFREQ                                               04403610
LINE 362         SKA(I) = SKA(I) & SAVE*CF(I,J)                                 04403620
LINE 363    820  CONTINUE                                                       04403630
LINE 364    C                                                                   04403640
LINE 365         IF( NTERM .EQ. 1 ) GO TO GOBACK, ( 150, 190, 340 )             04403650
LINE 366    C                                                                   04403660
```

```
LINE 367          SAVE = TV*V(NTERM) & TW*W(NTERM)                                    04403670
LINE 368          DO 830 I=1,NFREQ                                                    04403680
LINE 369          SKL = SKA(I)                                                        04403690
LINE 370          SKA(I) = SKA(I) & SAVE*CF(I,NTERM)                                  04403700
LINE 371          IF( KCONV .GT. 1000 ) GO TO 830                                     04403710
LINE 372          DIK = ABS( SKA(I) - SKL )                                           04403720
LINE 373          RERO = 1.0                                                          04403730
LINE 374          IF( SKA(I) .NE. 0.0 ) RERO = DIK/ABS(SKA(I))                        04403740
LINE 375          IF( RERO .LT. 0.05  ) GO TO 830                                     04403750
LINE 376          IF( SKA(I) .EQ. 0.0 .AND.  DIK .LT.  .E-7 ) GO TO 830               04403760
LINE 377  C           WE HAVE NOT CONVERGED                                           04403770
LINE 378          IF( KCONV .EQ. 0 ) WRITE( 16, 4009 )                                04403780
LINE 379          KCONV = KCONV & 1                                                   04403790
LINE 380          WRITE( 16, 4010 ) KCONV,IRC,IIN,NTERM,FREQ(I),SKA(I),SKL,RERO       04403800
LINE 381          IF( KCONV .LE. 1000 ) GO TO 830                                     04403810
LINE 382          WRITE( 16, 4011 )                                                   04403820
LINE 383          IFLUSH = 1                                                          04403830
LINE 384   830    CONTINUE                                                           04403840
LINE 385  C                                                                           04403850
LINE 386          GO TO GOBACK, ( 150, 190, 340 )                                     04403860
LINE 387  C                                                                           04403870
LINE 388    4009 FORMAT( 1H1, 120(1H*) // 10X, 85HTHE VELOCITY INFLUENCE COMPUTATIO04403880
LINE 389         1N DID NOT CONVERGE FOR AT LEAST ONE PAIR OF ELEMENTS // 15X,       04403890
LINE 390         2  3HREC, 5X, 4HINFL, 4X, 5HTERMS, 5X, 9HFREQUENCY, 8X, 5HFINAL,   04403900
LINE 391         3  12X, 8HPREVIOUS, 9X, 8HRELATIVE / 15X, 4HELEM, 4X, 4HELEM, 31X, 04403910
LINE 392         4  5HVALUE, 12X, 5HVALUE, 12X, 5HERROR / ).                        04403920
LINE 393    4010 FORMAT( I11, 2I3, I9, 4E17.6  )                                    04403930
LINE 394    4011 FORMAT( /// 1X, 120(1H*)  /    75H WARNING -  AT LEAST 1000 VELOCI04403940
LINE 395         1TY INFLUENCE COMPUTATIONS DID NOT CONVERGE.  /                     04403950
LINE 396         2 54H CONVERGENCE TESTING HAS BEEN TERMINATED FOR THIS RUN. // )    04403960
LINE 397          END                                                                04403970

/END READ
```

```
END OF JOB.

     43.1 SEC. USED     .012 HRS. CHARGED    49.906 HRS. REMAINING
```

DISPLAY...FILE DECK 45

```
LINE    1        SUBROUTINE   WRETA( NET, JMODE,W.  ' \, WETA,     113)                04500010
LINE    2        DIMENSION   WETA(NET,10),            WDETA(NET,10)                 04500020
LINE    3        REWIND  113                                                        04500030
LINE    4        DO 30       JM=1, JMODE                                            04500040
LINE    5        WRITE (113) JM, NET, (WDETA(I,JM), I=1,NET), (WETA(I,JM),I=1,NET) 04500050
LINE    6    30  CONTINUE                                                           04500060
LINE    7        END FILE  113                                                      04500070
LINE    8        REWIND 113                                                         04500080
LINE    9        RETURN                                                             04500090
LINE   10        END                                                                04500100
```

DISPLAY...FILE DECK 46

```
LINE    1          SUBROUTINE WRITEO (K,AROW, IZ, ANEW, NET)                    04600010
LINE    2          DIMENSION  AROW(NET), IZ(NET), ANEW(NET)                     04600020
LINE    3          COMMON /K1112/ KST11,KST12                                   04600030
LINE    4          COMMON  /TAPE/ I9,I10,I11                                    04600040
LINE    5           NNZ=0                                                       04600050
LINE    6          DO 100   I=1,NET                                             04600060
LINE    7           IF ( AROW( I) .EQ. 0.0)   GO TO 100                         04600070
LINE    8           NNZ = NNZ&1                                                 04600080
LINE    9           M = NNZ                                                     04600090
LINE   10           IZ(M) = I                                                   04600100
LINE   11           ANEW(M) = AROW(I)                                           04600110
LINE   12   100     CONTINUE                                                    04600120
LINE   13          IF(NNZ.EQ. 0)   RETURN                                       04600130
LINE   14          CALL WRITZ( I11,K,NNZ,IZ, ANEW)                              04600140
LINE   15          KST11 =K                                                     04600150
LINE   16           RETURN                                                      04600160
LINE   17           END                                                         04600170
```

```
DISPLAY...FILE          DECK 47

LINE    1       SUBROUTINE WRITZ( III,K,NNZ, IZ, ANEW)                  04700010
LINE    2       DIMENSION  IZ(NNZ), ANEW(NNZ)                           04700020
LINE    3       WRITE (III)  K,NNZ, IZ, ANEW                            04700030
LINE    4       RETURN                                                  04700040
LINE    5       END                                                     04700050
```

```
DISPLAY...FILE          DECK 48

LINE    1          SUBROUTINE WRITZW  (I12,K,NNZ,IZ,ANEW)                    04800010
LINE    2          DIMENSION  IZ(NNZ)                                        04800020
LINE    3          COMPLEX    ANEW(NNZ)                                     04800030
LINE    4          WRITE(I12) K,NNZ, IZ,ANEW                                04800040
LINE    5      200 CONTINUE                                                  04800050
LINE    6          RETURN                                                   04800060
LINE    7          END                                                      04800070
```

DISPLAY...FILE DECK 49

```
LINE    1          SUBROUTINE WTEPHT  (  DEDT,NET, PHIW, IZ,  I12,WTE)                04900010
LINE    2          COMPLEX  DEDT(1), PHIW(1), WTE(1)                                 04900020
LINE    3          DIMENSION IZ(1)                                                   04900030
LINE    4          COMMON /K1112/ KST11,KST12                                        04900040
LINE    5          KEL =  0                                                          04900050
LINE    6          DO 300       IEL=1,NET                                            04900060
LINE    7          IF(IEL .GT. KST12)  GO TO 300                                     04900070
LINE    8          IF(KEL.LT. IEL)                                                   04900080
LINE    9         1READ (I12)  KEL, NNZ, (IZ(I), I=1,NNZ), (WTE(I),I=1,NNZ)         04900090
LINE   10    204   IF(KEL.NE.IEL)  GO TO 300                                         04900100
LINE   11          DO 200      M=1,NNZ                                               04900110
LINE   12          K= IZ(M)                                                          04900120
LINE   13          I = IEL                                                           04900130
LINE   14          DEDT(I) =  DEDT(I) - WTE(M) *  PHIW(K)                            04900140
LINE   15    200   CONTINUE                                                          04900150
LINE   16    300   CONTINUE                                                          04900160
LINE   17          REWIND  I12                                                       04900170
LINE   18          RETURN                                                            04900180
LINE   19          END                                                               04900190
```

```
DISPLAY...FILE          DECK 50

LINE    1          SUBROUTINE WVINT                                                    05000010
LINE    2  C                                                                          05000020
LINE    3  C            XO,YO   COORDINATES OF RECEIVING PT.(CENTER OF REC. ELE. )   05000030
LINE    4  C            XUP, YUP COORDINATES OF UPPER END OF LINE                    05000040
LINE    5  C            XLW, YLW COORDINATES OF LOWER END OF LINE                    05000050
LINE    6  C            ZDZD IS THE SQUARE OF THE DIFFERENCE OF THE REC AND INFL Z'S 05000060
LINE    7  C            ZD        DIFFERENCE BETWEEN Z'S  OF INFLU. AND RECEIV. ELEM.05000070
LINE    8  C           V, W      SIDE WASH AND UPNASH INTEGRALS                     05000080
LINE    9  C           NTERM     NUMBER OF TERMS IN APPROXIMATION OF V AND W        05000090
LINE   10  C                                                                        05000100
LINE   11          REAL L1                                                          05000110
LINE   12          DIMENSION  GETA(5), GCOF(5), XX(3), AG(3)                        05000120
LINE   13          DIMENSION H(31)                                                  05000130
LINE   14          COMMON / EEW / XUP, YUP, XLW, YLW                                05000140
LINE   15          COMMON / WV1 / NTERM, V(30), W(30)                               05000150
LINE   16          COMMON / WW1 / XO,YO,ZD,ZDZD                                     05000160
LINE   17          DATA NGT / 5 /                                                   05000170
LINE   18          DATA  PIO2  / 1.570796 /                                         05000180
LINE   19          DATA     XX(1), AG(1),   XX(2), AG(2),   XX(3), AG(3)   /       05000190
LINE   20         *.90617984593866399279762687 82,   .23692688505618938751426404 07,  05000200
LINE   21         *.53846931010568309103631442 07,   .47862867049936646804129151 48,  05000210
LINE   22         *.0000000000000000000000000 0,   .55888888888888888888888888 88  /05000220
LINE   23  C                                                                        05000230
LINE   24  C            SET UP CONSTANTS                                            05000240
LINE   25          ZUP = XO - XUP                                                   05000250
LINE   26          ZLW = XO - XLW                                                   05000260
LINE   27          EUP = YO - YUP                                                   05000270
LINE   28          ELW = YO - YLW                                                   05000280
LINE   29          ZZUP = ZUP*ZUP                                                   05000290
LINE   30          ZZLW = ZLW*ZLW                                                   05000300
LINE   31          EEUP = EUP*EUP                                                   05000310
LINE   32          EELW = ELW*ELW                                                   05000320
LINE   33          SLOPE = (XUP-XLW)/(YUP-YLW)                                      05000330
LINE   34          ALPHA = ZLW - SLOPE*ELW                                          05000340
LINE   35          AA = ALPHA*ALPHA                                                 05000350
LINE   36          TTUP = EEUP & ZDZD                                               05000360
LINE   37          TTLW = EELW & ZDZD                                               05000370
LINE   38          RRUP = ZZUP - TTUP                                               05000380
LINE   39          RRLW = ZZLW - TTLW                                               05000390
LINE   40          IF( RRUP .LT. 0.0  .OR.  ZUP .LE. 0.0 )  RRUP = 0.0              05000400
LINE   41          IF( RRLW .LT. 0.0  .OR.  ZLW .LE. 0.0 )  RRLW = 0.0              05000410
LINE   42          RUP = SQRT( RRUP )                                               05000420
LINE   43          RLW = SQRT( RRLW )                                               05000430
LINE   44          SS = SLOPE*SLOPE                                                 05000440
LINE   45          TESTC = SS - 1.0                                                 05000450
LINE   46          AMZ = AA & SS*ZDZD                                               05000460
LINE   47          ACZ = AMZ - ZDZD                                                 05000470
LINE   48          SIGNU = SIGN( PIO2, EUP )                                        05000480
LINE   49          SIGNL = SIGN( PIO2, ELW )                                        05000490
LINE   50          SZZ = SLOPE*ZDZD                                                 05000500
LINE   51  C                  FO                                                    05000510
LINE   52          SQRC = ABS( TESTC )                                              05000520
LINE   53          IF( SQRC .LT. 0.001  ) GO TO 20                                  05000530
LINE   54          SQRC = SQRT( SQRC )                                              05000540
LINE   55          SQACZ = SQRT( ACZ )                                              05000550
LINE   56          IF( TESTC .GT. 0.0 ) GO TO 22                                    05000560
```

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LINE   57  C                C .LT. 0      ( TESTC = C ) COMPUTE S2                  05000570
LINE   58          FU =-SIGNU                                                      05000580
LINE   59          IF( RUP .GT. 0.0 ) FU = [illegible] ( (SLOPE*ZUP-EUP)/SQACZ )   05000590
LINE   60          FL =-SIGNL                                                      05000600
LINE   61          IF( RLW .GT. 0.0 ) FL = A[illegible] ( (SLOPE*ZLW-ELW)/SQACZ )  05000610
LINE   62          FO = -( FU - FL )/SQRC                                          05000620
LINE   63          GO TO 30                                                        05000630
LINE   64       20 CONTINUE                                                        05000640
LINE   65  C                   C = 0                                              05000650
LINE   66          FO = (RUP - RLW) / ( SLOPE-[illegible]HA )                      05000660
LINE   67          GO TO 30                                                        05000670
LINE   68       22 CONTINUE                                                        05000680
LINE   69          FU = SQRC*RUP & SLOPE*ZUP - EUP                                 05000690
LINE   70          FL = SQRC*RLW & SLOPE*ZLW - ELW                                 05000700
LINE   71          IF( RLW .EQ. 0. ) GO TO 26                                      05000710
LINE   72          IF( RUP .EQ. 0. ) GO TO 24                                      05000720
LINE   73  C                   C .GT. 0   NEITHER RUP NOR RLW IS ZERO              05000730
LINE   74          FO = ( ALOG(FU/FL) / SQRC )                                     05000740
LINE   75          GO TO 30                                                        05000750
LINE   76  C                   C .GT. 0   RUP .EQ. 0                               05000760
LINE   77       24 CONTINUE                                                        05000770
LINE   78          FO = ( ALOG( ABS(SQACZ/FL) ) )/SQRC                             05000780
LINE   79          GO TO 30                                                        05000790
LINE   80       26 CONTINUE                                                        05000800
LINE   81          FO = ( ALOG( ABS(FU/SQACZ) ) )/SQRC                             05000810
LINE   82  C                   FO HAS BEEN COMPUTED                               05000820
LINE   83       30 CONTINUE                                                        05000830
LINE   84  C              FIND AL1  ( AL1 IS CALLED L1 IN THE NOTES )              05000840
LINE   85          ALU = 0.0                                                       05000850
LINE   86          ALL = ZUP - RUP                                                 05000860
LINE   87          IF( RUP .GT. 0.0  .AND.  ALL .GT. .1E-5 )                       05000870
LINE   88         1              ALU = 0.5*ALOG( (ZUP&RUP)/ALL )                  05000880
LINE   89          ALL = 0.0                                                       05000890
LINE   90          AL1 = ZLW - RLW                                                 05000900
LINE   91          IF( RLW .GT. 0.0  .AND.  AL1 .GT. .1E-5 )                       05000910
LINE   92         1              ALL = 0.5 *ALOG( (ZLW&RLW)/AL1 )                 05000920
LINE   93          AL1 = ALU - ALL                                                 05000930
LINE   94  C                   FIND S1                                            05000940
LINE   95          S1 = 0.0                                                        05000950
LINE   96          IF( ZD .EQ. 0 ) GO TO 40                                        05000960
LINE   97          FL = ALPHA*ELW - SZZ                                            05000970
LINE   98          SL = SQRT( TTLW*ACZ )                                           05000980
LINE   99          FU = ALPHA*EUP - SZZ                                            05000990
LINE  100          IF( RUP .EQ. 0 ) GO TO 32                                       05001000
LINE  101          SU = SQRT( TTUP*ACZ )                                           05001010
LINE  102          IF( RLW .EQ. 0 ) GO TO 34                                       05001020
LINE  103  C                   S1  FOR RUP .GT. 0,  RL .GT. 0  AND ZD .NE. 0      05001030
LINE  104          S1 = ARSIN(FU/SU) - ARSIN(FL/SL)                                05001040
LINE  105          GO TO 40                                                        05001050
LINE  106       32 CONTINUE                                                        05001060
LINE  107          S1 = SIGN( PIO2, FU )  -  ARSIN(FL/SL)                          05001070
LINE  108          GO TO 40                                                        05001080
LINE  109       34 CONTINUE                                                        05001090
LINE  110          S1 = ARSIN(FU/SU) - SIGN( PIO2,FL )                             05001100
LINE  111       40 CONTINUE                                                        05001110
LINE  112  C                                                                       05001120
LINE  113  C              F1  AND  F2                                              05001130
LINE  114  C                                                                       05001140
LINE  115          F1 = (ALPHA*ZD*S1/AMZ) & SZZ*AL1/AMZ                            05001150
LINE  116          F2 = SLOPE*F1 - AL1                                             05001160
LINE  117  C                                                                       05001170
LINE  118          W(1) =  RUP*EUP/TTUP - RLW*ELW/TTLW - TESTC*FO & SS*F1 - SLOPE*F2 05001180
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```
LINE 119          IF( NTERM .LE. 1 ) GO TO 71                                    05001190
LINE 120    C                                                                    05001200
LINE 121          W(2) =                                                         05001210
LINE 122         1        -0.5*( (ZUP&ALPHA)*EUP*ALU - (ZLW&ALPHA)*ELW*ALL      05001220
LINE 123         2      -  RUP*EUP & RLW*ELW ) - 0.5*(AA-3.0*TESTC*ZDZD)*F0     05001230
LINE 124         3      - (1.5*SZZ-2.0*AA)*F1 & 3.5*SZZ*F2                      05001240
LINE 125    C                                                                    05001250
LINE 126          IF( NTERM .LE. 2 ) GO TO 71                                    05001260
LINE 127    C                                                                    05001270
LINE 128          NHT = NTERM - 2                                                05001280
LINE 129          IWT = NTERM - 1                                                05001290
LINE 130    C                                                                    05001300
LINE 131    C          FIND 5 PT. GAUSS-LEFENDRE POINTS AND COEFFICIENTS (GETA,GCOF)05001310
LINE 132          F1 = 0.5*(EUP - ELW)                                           05001320
LINE 133          F2 = 0.5*(ELW & EUP)                                           05001330
LINE 134          DO  43  IG=1,3                                                 05001340
LINE 135          N = 6 - IG                                                     05001350
LINE 136          F0        =  F1*XX(IG)                                         05001360
LINE 137          GETA(N)   =  F0 & F2                                           05001370
LINE 138          GETA(IG) = -F0 & F2                                            05001380
LINE 139          GCOF(IG) =  F1*AG(IG)                                          05001390
LINE 140       43 GCOF(N)   =  GCOF(IG)                                          05001400
LINE 141    C                                                                    05001410
LINE 142    C                                                                    05001420
LINE 143          DO 45  N=3,NTERM                                               05001430
LINE 144          V(N) = 0.0                                                     05001440
LINE 145       45 W(N) = 0.0                                                     05001450
LINE 146    C                                                                    05001460
LINE 147    C                                                                    05001470
LINE 148    C          LOOP ON TERMS OF QUADRATURE                               05001480
LINE 149          DO 70 IG=1,NGT                                                 05001490
LINE 150    C                                                                    05001500
LINE 151          ETA = GETA(IG)                                                 05001510
LINE 152          ZETA = SLOPE*ETA & ALPHA                                       05001520
LINE 153          IF( ZETA .LE. 0.0 )  GO TO 70                                  05001530
LINE 154          TTHH = ETA*ETA & ZDZD                                          05001540
LINE 155          RR = ZETA*ZETA - TTHH                                          05001550
LINE 156          IF( RR .LE. 0.0 ) GO TO   70                                   05001560
LINE 157          COF = GCOF(IG)                                                 05001570
LINE 158          RH = SQRT( RR )                                                05001580
LINE 159          FL = ZETA - RH                                                 05001590
LINE 160          ALH = 0.0                                                      05001600
LINE 161          IF( (FL/ZETA) .GT. 1.E-6) ALH = 0.5*ALOG( (ZETA&RH)/FL )       05001610
LINE 162    C           LOOP TO FIND NHT (=NTERM) H TERMS                        05001620
LINE 163          H(1) = ZETA*ALH - RH                                           05001630
LINE 164          DO 50 N=1,NHT                                                  05001640
LINE 165          NH = N&1                                                       05001650
LINE 166          N2 = 2*N                                                       05001660
LINE 167          RH = RH*RR                                                     05001670
LINE 168          H(NH) = RH/(N2*(N2&1))   -   (N2-1)*TTHH*H(N)/N2               05001680
LINE 169       50 CONTINUE                                                       05001690
LINE 170    C                                                                    05001700
LINE 171    C       FIND CONTRIBUTION OF UPWASH FOR A GIVEN PT. (FOR A GIVEN IG) 05001710
LINE 172          DO 60 N=2,IWT                                                  05001720
LINE 173          NW = N&1                                                       05001730
LINE 174          W(NW) = W(NW) - COF*(2*N-1)*( H(N) - (2*(N-1)-1)*ZDZD*H(N-1) ) 05001740
LINE 175       60 CONTINUE                                                       05001750
LINE 176    C                                                                    05001760
LINE 177       70 CONTINUE                                                       05001770
LINE 178    C                                                                    05001780
LINE 179    C                                                                    05001790
LINE 180       71 CONTINUE                                                       05001800
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LINE 181  C                                                                    05001810
LINE 182        V(1) = 0.0                                                     05001820
LINE 183        V(2) = 0.0                                                     05001830
LINE 184  C                                                                    05001840
LINE 185  C                                                                    05001850
LINE 186  C          IF  ZD = 0, THERE IS NO SIDEWASH                          05001860
LINE 187        IF( ZD .EQ. 0.0 ) RETURN                                       05001870
LINE 188  C                                                                    05001880
LINE 189  C        SECTION FOR SIDEWASH                                        05001890
LINE 190  C                                                                    05001900
LINE 191        V(1) =      - ZD*( RUP/TTUP - RLW/TTLW )                       05001910
LINE 192        IF( NTERM .LE. 1 ) GO TO 90                                    05001920
LINE 193        HU = ZUP*ALU - RUP                                             05001930
LINE 194        HL = ZLW*ALL - RLW                                             05001940
LINE 195        V(2) =      - ZD*( HU - HL )                                   05001950
LINE 196        IF( NTERM .LE. 2 ) GO TO 90                                    05001960
LINE 197        RSU = RUP                                                      05001970
LINE 198        RSL = RLW                                                      05001980
LINE 199  C                                                                    05001990
LINE 200        DO 80 N=2,IWT                                                  05002000
LINE 201        NV = N&1                                                       05002010
LINE 202        NH = N-1                                                       05002020
LINE 203        N2 = 2*NH                                                      05002030
LINE 204  C          NOTE THAT H IS COMPUTED FOR NH = N-1                      05002040
LINE 205        IF( RUP .EQ. 0.0 ) GO TO 74                                    05002050
LINE 206        RSU = RSU*RRUP                                                 05002060
LINE 207        HU  = RSU/(N2*(N2&1)) - (N2-1)*TTUP*HU/N2                      05002070
LINE 208   74   CONTINUE                                                       05002080
LINE 209        IF( RLW .EQ. 0.0 ) GO TO 76                                    05002090
LINE 210        RSL = RSL*RRLW                                                 05002100
LINE 211        HL  = RSL/(N2*(N2&1)) - (N2-1)*TTLW*HL/N2                      05002110
LINE 212   76   CONTINUE                                                       05002120
LINE 213        V(NV) =      - ZD*(2*N-1)*( HU - HL )                          05002130
LINE 214   80   CONTINUE                                                       05002140
LINE 215  C                                                                    05002150
LINE 216   90   CONTINUE                                                       05002160
LINE 217        RETURN                                                         05002170
LINE 218        END                                                            05002180
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    DISPLAY...FILE          DECK 51

    LINE    1          SUBROUTINE  ZFDZ( ZFUN, DZDX, X,Y,A)                                    05100010
    LINE    2  C            SUBROUTINE TO EVALUATE FUNCTION (ZFUN), AND DERIVATIVE (DZDX)05100020
    LINE    3          DIMENSION    X(1),Y(1), A(1)                                          05100030
    LINE    4          COMMON  /ZFUNNY/  N,IERF, B1, B2,B3,NFUNMX                            05100040
    LINE    5          COMMON /XYSCAL / XX, YY, XO, YO, BREF, ZZZ, ITEST                     05100050
    LINE    6              DATA EPS/1.E-78/                                                  05100060
    LINE    7           XP = XO&BREF*XX                                                      05100070
    LINE    8           YP = YO&BREF*YY                                                      05100080
    LINE    9           ZFUN = B1&B2*XP&B3*YP                                                05100090
    LINE   10          DZDX = B2                                                             05100100
    LINE   11           DO 1 I=1,N                                                           05100110
    LINE   12          XPMXI = XP - X(I)                                                     05100120
    LINE   13          R2 = XPMXI*XPMXI & (YP-Y(I))**2                                       05100130
    LINE   14          R2PEPS = R2 & EPS                                                     05100140
    LINE   15          XXLOG = ALOG( R2PEPS )                                                05100150
    LINE   16          ZFUN = ZFUN & A(I)*R2*XXLOG                                           05100160
    LINE   17          DZDX = DZDX & 2.0*A(I)*XPMXI*( XXLOG & R2/R2PEPS )                    05100170
    LINE   18      1    CONTINUE                                                             05100180
    LINE   19           RETURN                                                               05100190
    LINE   20          END                                                                   05100200

/END READ


END OF JOB.

     53.6 SEC. USED     .015 HRS. CHARGED    49.937 HRS. REMAINING
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